[redacted]

Chapter VII

★

COMMUNICATIONS AND TRANSPORTATION

BULGARIA

(JANIS No. 38)

★

OCTOBER · 1943

Table of Contents

Chapter VII

COMMUNICATIONS AND TRANSPORTATION

70. *General Description*

Communication and transportation facilities in Bulgaria are relatively sparse and poor in comparison with western Europe and the United States. Neither the road nor rail net is built for heavy loads. Nevertheless, a network of rail, improved road, telephone and telegraph lines connects the major centers (Figures VII - 1 to 4; Plans VII - 1 and 2). Few inhabited places, for example, are more than 20 miles from a railroad and practically every commune has a telephone exchange. But radio stations and receiving sets are particularly scarce.

Bulgaria is strategically situated on the principal routes from western Europe to Turkey and the Aegean. The main route (followed by the Orient Express) enters northwestern Bulgaria, passes through Sofiya* and Plovdiv and on to Turkey in the southeast. This is the main rail and road connection as well as the main telephone and telegraph route, although since 1941, the main trunk wire service has been routed north from Plovdiv to Ruse and Bucureşti and on to Germany via Rumania because of guerilla activities in Yugoslavia. Outside the international route just described, there are only a few other connections to foreign countries. The Danube, the only navigable waterway, forms a barrier to rail connections on the north and is crossed by no bridge and only one car ferry at Ruse.

A. Communications.

The radio, telephone and telegraph facilities of Bulgaria are poorly developed according to Western European or American standards. The only known broadcasting stations are at Sofiya, Varna, and Stara-Zagora. Radio-telegraphic stations have been installed at several airfields and coastal points. Although telephones are few, the lines are widespread. The telegraph system is less extensive than that of the telephone.

Lines are almost wholly aerial and generally follow roads and railroads. All facilities are governmentally operated. The chief vulnerable points are the few repeater stations, the trunk high-frequency lines, and the main exchanges.

B. Transportation.

Sofiya is the principal focus of transport routes. From it all parts of the country can be reached more readily than from any other point. Improved rail and road routes connect Sofiya with Burgaz and Varna on the Black Sea and connect Sofiya with the Aegean on the south via the Struma Valley. The rail connection on the latter route is partly narrow gauge but a standard-gauge line is under construction.

Rough and mountainous terrain in many parts of the country handicaps transportation. Sharp curves and grades are common on the railroads and roads. Tunnels and bridges also make the railroads particularly vulnerable. The relative poverty of the country has prevented costly improvements and has accentuated the handicap of rough terrain.

All Bulgarian railroads are steam operated, practically all are single track and 90 per cent are standard gauge. The lines are owned and operated by the government under surveillance of German liaison officers.

The railroads are neither well built nor well maintained. Roadbeds are weak and rails are light. On a few routes the maximum permissible axle load is 17 metric tons, but on most standard-gauge lines it is only 14 tons. Equipment is poor as well as scarce. Freight cars, for example, are not equipped with air brakes.

Consequently the capacity of the railroads is low. Most lines cannot handle more than 12 trains daily in each direction. Net loads of military trains exceed 300 metric tons (330 short tons) on a few routes; they are lower, however, on all others.

The network of improved roads is sparse, although fairly good roads connect all major cities (Plan VII - 2). The main road is the international route from Yugoslavia to Turkey, described earlier. Other main routes connect Sofiya with Burgaz on the Black Sea, and with Greece and the Aegean via the Struma Valley. There are other connections, including a number of roads to the Yugoslav frontier.

Most major roads such as those described above are water-bound macadam. Almost all of them are two-way with occasional narrow sections in the mountains. However, local roads are generally narrow and have an unimproved dirt surface. Sharp curves and steep grades are the rule on mountain roads. The main weaknesses of the road system are the absence of good alternate routes and the limited capacities of the bridges.

Inland waterway transport is confined to the Danube which forms the northern border of the country. Its minimum depth of eight feet is enough to accommodate fairly large river steamers and barges of 2–3,000 metric tons capacity. Bulgaria's share in the traffic is less than her neighbors'.

Bulgaria's merchant fleet consists of only four vessels of over 1,000 gross registered tons, the newest of which was built in 1914. Its use has been restricted principally to coasting trade in the Black Sea.

71. *Radio and Special Wireless Services*

Information on the development of radio facilities in Bulgaria since 1940 is fragmentary and largely confined to aerial reconnaissance reports. Probably most of the facilities, concerning which information was available in peacetime (see Figure VII - 1), have been abandoned, altered, or used for new functions. Nearly all facilities seem to be under German control, and it is likely that in many places the Germans have installed their own equipment.

**See Appendix I for spellings of all features.* The following spellings of features as used in this Chapter differ slightly from those on G.S.,G.S. maps, Series 4072 and 4088: Bebrezh, Bozhurishte, Canara (Kana-Gol), Carasuum, Cherni Iskr, Chiporovtsi, Devna, Dobrich (Bazargic), Dobrinishta, Dubovo, Ellidere, Emine (town), Ghiaur Suiuciuc (Chiaur Suiuciuc), Gorna Dzhumaya, Gorna Orekhovitsa (Gln.-Orekhovitsa), Gulubovo (Gara-Glebovo), Kazanlk, Kharmanli, Koprivshtitsa, Kuri Burnu, Ladzhene (Lzhene), Musala, Panagyurishte, Paphia (Mt.), Peinirdzhik, Perushtitsa, Peshtera, Piraiévs, Pirdop (Pirdol), Polikraishte, Rakovets, Resen (Pesen), Sofiya, Sredets, Stizharov, Surnena Gora (Srneha Gora), Svishtov, Syuyutliika, and Trgovishte.

A. The radio system.

(*1*) ***Broadcasting stations.*** The principal station in Bulgaria is Radio Sofiya, with a 100-kilowatt transmitter at Vakarel, 25 miles southeast of Sofiya. A short-wave station at Sofiya and medium-wave stations at Varna and Stara-Zagora relay the programs of Radio Sofiya. The medium-wave stations also broadcast independently.

German reports state that five new medium-wave stations (probably for relaying) and a 50-kilowatt short-wave transmitter are being erected in Bulgaria.

(*2*) ***Administration.*** Broadcasting is a state monopoly. Technical operations are managed by the Office of Radio Service, under the Administration of Posts, Telegraphs, and Telephones in the Ministry of Railways and Communications, while the supervision of programs is in the hands of a Director of Propaganda, who appears to be subordinate to the Minister of Interior.

Bulgarian radio facilities are now available to the Axis, although the Bulgarian Government still uses more than half of the operating time. The Germans use the Bulgarian transmitters for broadcasts in Greek, Serbian, Turkish, and occasionally English.

(*3*) ***Reception of broadcasts.*** Radio is not an important means of influencing Bulgarian opinions, because receiving sets are scarce. In 1940 there were 79,314 registered sets in the country and an estimated 8–10,000 unregistered sets, or roughly one set to every 71 persons. One third of the registered sets were in Sofiya, another third in 16 other principal towns.

The Bulgarian Government has tried, with German encouragement, to increase the number of listeners. Loudspeakers are being installed in the central squares of some of the towns, particularly in the newly acquired territories, and sets have been imported for use in the schools. A March 1942 estimate of 156,000 private receiving sets, while probably including sets in the recovered provinces which did not appear in the earlier figures, suggests that a considerable number of sets have been imported in the last few years.

Most of the sets sold before the war could receive short-wave broadcasts. Since October 1941 all enemy aliens have been deprived of equipment enabling them to listen to foreign broadcasts, and regulations forbid listening to any but official Axis programs. However, official broadcasts are so unsatisfactory—they give only local news and a daily reading of German and Italian communiques—that most owners of sets are reported to listen regularly to British broadcasts.

The Moskva (Moscow) Radio, the B.B.C., and the German Donau station in Austria all carry regular short-wave broadcasts in Bulgarian. In addition to these, the Russians, British, and Germans each maintain pseudo-clandestine stations claiming to represent patriotic Bulgarians. The German "United Bulgaria" station, probably located in Germany, operates on 7,410 kilocycles. The Russians operate a station, known as "Hristo Botev" or "Free Bulgaria," on 11,590 kilocycles. The British, using transmitters in England or Cairo, broadcast programs under the titles of "Vasil Levski" ("Bulgarian Freedom Station"), reported on 10,008 kilocycles; "Free and Independent Bulgaria," on 7,550 kilocycles; and "Bulgarians Speak for Bulgaria," on 7,070 kilocycles. "Clandestine" stations are being used less by the British and Russians as their official broadcasts show signs of becoming more popular in Bulgaria.

Most receiving sets are imported, primarily from Germany and the Netherlands; the most widely used seem to be Philips, Telefunken, Blau Punkt, Saba, and Standard. In 1939, four-tube sets were the most popular among those registered, with three- and five-tube sets coming next. Three-, four- and five-tube sets account for almost 80 per cent of the total number.

B. Point-to-point communication.

Facilities for point-to-point radio telegraphic communication have always been state-owned (Figure VII - 1); amateur and other private transmitting is prohibited. All installations are now in the hands of the Germans, who have brought in dynamos and other equipment to reinforce the existing facilities and have apparently erected additional stations to improve the communications network. In Sofiya, the Germans have requisitioned the Hotel Continental and other buildings for billeting some 400 women radio operators, who are replacing male personnel.

The transmitting equipment of the Bulgarian stations is mostly Telefunken (German) and Marconi (British), although some parts are locally made. Receiving equipment is Telefunken, Marconi, and Magnetti.

Up to 1940 no point-to-point radio telephonic equipment had been reported. The government has four teletypes, used experimentally only.

C. Communication with aircraft.

The airfields at Sofiya-Bozhurishte and Burgaz-Sarafovo, both owned by the Air-France Company until the war, were each equipped for both telegraphic and telephonic communication with planes (Figure VII - 1). They transmitted on 260, 284 and 333 kilocycles, and received on frequencies ranging from 100-1,710 kilocycles. Apparently neither field had direction-finder or radiobeacon equipment before the war. Probably the facilities at both fields have been altered.

TABLE VII - 1

BULGARIA, RADIO STATIONS, 1943

Town Station Name Call Sign	Function (Type of Emission)	Co-ordinates of Transmitter	Locational Data	Frequencies (kc.)	Power in Antenna	Remarks
SOFIYA						
Radio Sofiya, National Radio	BC medium-wave	42 34 00 N. 23 42 15 E.	Transmitter at Vakarel, about 25 mi. SE of Sofiya. Studio (newly completed) in Sofiya.	850	100 kw.	Built in 1937 by German Telefunken Company. Used for broadcasting Axis propaganda in several languages. Most of its programs are rebroadcast by the Sofiya short-wave station and the Varna and Stara-Zagora medium-wave stations.

TABLE VII - 1—(*Continued*)

Town Station Name Call Sign	Function (Type of Emission)	Co-ordinates of Transmitter ° ′ ″	Locational Data	Frequencies (kc.)	Power in Antenna	Remarks
LZA	BC (relay), FX, short-wave	42 43 10 N. 23 19 30 E.	In the Kurilo section N of the main railroad station.	14970 (elsewhere reported as 8468 kc.)	1.5 kw. 7 kw.	Apparently handles both broadcasting relays and radio-telegraphy; it is not clear which of the frequencies and antenna powers listed is used for each function.
LZB	FX, short-wave	42 43 25 N.	Near the LZA transmitter	7460	7 kw.	
LZC	"	23 19 18 E.	"	10315	8 kw.	British Marconi transmitters.
LZD	"	"	"	5835	8 kw.	
LZS	FX, long-wave	"	"	105.26	13 kw.	Transmitter of a Bulgarian make.
—	FX	—	Reported to be in the S part of Sofiya just N of the military railroad station and W of the American college.	—	—	This German station is reported without details.
Bozhurishte Airdrome, LZJ	FA, D/F	42 46 00 N. 23 12 00 E.	Airdrome is 7 mi. WNW of Sofiya.	—	1 kw.	Bulgarian and German D/F's reported on east edge of field; German radio on west edge; field may also have radiobeacon.
Vrazhdebna Airdrome	FA	42 42 N. 23 25 E. (Airdrome)	Airdrome is 3 mi. E of Sofiya.	—	—	Radio facilities reported.
VARNA						
Radio Varna	BC, relay	43 13 45 N. 27 53 30 E.	3 mi. NW of Varna at junction of Shumen and Dobrich (Bazargic) highways, near the Polish war monument. Studio in center of town, probably just off Preslavska St. (See Fig. V - 3.)	1276	2 kw. (unmodulated power consumption 11.15 kw.)	Installed in 1936; its main function is to relay Sofiya broadcasts, although it also broadcasts programs of its own. Two masts, surrounded by white houses, are visible from the air. Studio and transmitter connected by two-wire, open-wire lines. Equipment made by Standard Electric Company of Hungary.
Varna Post Office Station	FX	—	Transmitter in Post Office on Saborni St. (See Fig. V - 3.)	—	—	Mast on roof of Post Office building. Communicates with Sofiya and Beograd.
Old Post Office Station	FX	—	On a hill 3 mi. NE of BC transmitter, at the old "Ildiz-Tabia" Fort near Franga.	—	—	Despite its impressive appearance (it has 5 masts), this station is abandoned and would have to be re-equipped before it could be used.
Naval Station	FC	—	In courtyard of Naval Barracks at SW corner of harbor.	—	—	—
Naval Station	FC, D/F	—	On coast at Galata, just S of Varna.	—	—	—
Peinirdzhik Seaplane Base	FA	43 11 N. 27 47 E. (Seaplane Base)	5 mi. WSW of Varna on S bank of Lake Devna.	—	—	These facilities also serve nearby Chaika Airdrome.
—	Probably FX	—	—	—	—	Germans reported to have built a station near Varna, but no information on function or location is available.
STARA-ZAGORA						
Radio Stara-Zagora	BC, relay	42 23 40 N. 25 42 30 E.	Transmitter 3–4 mi. SE of Stara-Zagora, studio in town.	1402	2 kw. (unmodulated power consumption 11.15 kw.)	Installed in 1936; its main function is to relay Sofiya broadcasts, although it also broadcasts independently for two hours a day. Studio and transmitter connected by two-wire, open-wire lines. Equipment made by Standard Electric Co. of Hungary.
Stara-Zagora Airdrome	FA	42 25 N. 25 38 E.	2 mi. SSE of Stara-Zagora.	—	—	Latest (1943) aviation sources fail to mention radio facilities reported earlier.
BURGAZ						
Sarafovo Airdrome, LZY	FA	42 34 00 N. 27 30 00 E.	6.5 mi. NNE of Burgaz 1.5 mi. inland.	—	250 w.	—
—	Probably FC	—	Transmitter at Sozopol, 14 mi. SE of Burgaz.	—	—	The headquarters of the coast guard service, at Cape Emine, is reported to be connected with this Sozopol transmitter.

TABLE VII - 1—(*Concluded*)

Town Station Name Call Sign	Function (Type of Emission)	Co-ordinates of Transmitter ° ′ ″	Locational Data	Frequencies (kc.)	Power in Antenna	Remarks
CALIACRA						
Cape Caliacra Beacon, Z	RB, modulated telegraphy	43 21 45 N. 28 29 30 E.	On Cape Caliacra, in the southern Dobrogea.	309.3 kc.	250 w.	Range: 100 naut. mi. Automatic signal continuous in foggy weather at intervals in clear weather.
RUSE	—	—	—	—	200 w.	200 w. transmitter reported, no details given.
KYUSTENDIL	—	—	—	—	—	Station here reported to have been recently dismantled.
AIRDROMES AT:		Co-ordinates of Airfields				
Gorna Orekhovitsa	FA	43 07 N. 25 42 E.	2 mi. NNE of town.	—	—	—
Graf Ignatiev	FA	42 18 N. 24 42 E.	1 mi. NW of town, 11 mi. N of Plovdiv.	—	—	—
Kazanlk	FA	42 38 N. 25 22 E.	1.2 mi. NW of town.	—	—	—
Pleven (Opanets)	FA	43 28 N. 24 32 E.	6 mi. NW of town.	—	—	—
Plovdiv	FA	42 09 N. 24 44 E.	1.5 mi. SE of town.	—	—	—
Yambol	FA	42 30 N. 26 30 E.	1.2 mi. NNW of town.	—	—	—
Karlovo (Marino-pole)	FA	42 38 N. 24 52 E.	5 mi. SE of town.	—	—	Latest (1943) aviation sources fail to mention facilities reported here earlier.
Lovech	FA	43 09 N. 24 42 E.	1 mi. N of town.			"
Telish	FA	43 20 N. 24 14 E.	1.2 mi. NW of town, on Pleven-Lukovit road.	—	—	"

ABBREVIATIONS:
BC—Broadcasting
FX—Point-to-point, radiotelegraphy
FA—Aeronautical station
FC—Coastal station
D/F—Direction-finder, aeronautical or maritime
RB—Radiobeacon, aeronautical or maritime

w.—watts
kw.—kilowatts
kc.—kilocycles
To transform kilocycles (frequency) into metres (wave-length) or vice-versa, divide 300,000 by the known figure.

D. Communication with ships.

Bulgaria is reported to have coastal radio stations at Varna and Burgaz, a maritime direction-finder near Varna, and a maritime radiobeacon on Cape Caliacra in southern Dobrogea (Dobruja), (Figure VII - 1).

E. List of stations.

The radio stations of Bulgaria are listed in Table VII - 1. The power, frequencies and type of equipment of the airfield stations listed are not known. The Germans have presumably adapted all such facilities to their own operational methods.

72. *Telegraph*

A. Pattern of the network.

The pattern of the telegraphic network is indicated in Fig. VII - 1.

(*1*) ***Extent of system.*** The only telegraph and telephone facilities in Bulgaria are those operated by the state. The importance of the telegraph system has steadily declined as the telephone network has grown, so that in 1939 the total length of lines was one-fourth that of 1930, while the total length of wires had declined by one-third during the same period. This decrease cannot, as in some countries, be explained by the intensive use of a few conductors by rapid and simultaneous working, with high-frequency and multiple equipment, as neither has been used for telegraphy in Bulgaria. However, telephone wires in Bulgaria have been used for telegraphy for many years, when necessary. Trunk telegraph lines are few, and operators in small places often have to cut in on lines already in use.

Length of lines (1939): 367 miles aerial, 5½ miles underground.
Length of wire (1939): 3713 miles aerial, 187 miles underground.
Number of circuits, simple, simplex and duplex (1941): 145.

(*2*) ***Chief international circuits.*** The principal international telegraph circuits are shown on Table VII - 2.

TABLE VII - 2
BULGARIA, INTERNATIONAL TELEGRAPHIC CIRCUITS

Sofiya/Beograd, Yugoslavia
Plovdiv/Edirne, Turkey/Istanbul
Bitolj/Korca, Albania/Tirana (opened in 1942)
Sofiya/Thessaloníki, Greece
Ruse/Bucureşti, Rumania

(*3*) ***Localization of lines.*** Lines usually follow the railroads, and offices are at the railroad station, town hall, or post office.

B. Ownership and operation.

The governmental agency operating telegraph lines other than those exclusively serving the railways, is the Posts, Telephone and Telegraph Administration, a branch of the Ministry of Railways and Communications.

C. Stations.

(1) *Number.* In 1939 there were 798 stations. By 1941, these had been increased to 963 of the post, telephone and telegraphic administration and 19 of the railroad system.

(2) *Equipment.* Statistics on the number of instruments are conflicting, but information as to the kinds of equipment is clear. In 1939 there were 893 telegraph instruments in use, according to official figures. A reliable source reports that there were 541 Morse, 42 Hughes, and four Siemens machines in use in 1940. This number is small compared with the number of stations, but the preponderance of Morse equipment and the use of a few Hughes teleprinters and several Siemens teletypes are in accord with other information. Equipment is almost exclusively German. Neither high-frequency nor multiple equipment was used on any of the 145 circuits reported in 1941.

Limited budgets in recent years have prevented much improvement of equipment or service.

D. Route equipment.

Lines are almost wholly aerial.

E. Vulnerable features.

Trunk lines are few. The system as a whole cannot carry a large volume of messages, so that any damage is likely to hamper communications, especially if done at a critical time.

73. *Telephones*

A. Pattern of the network.

The pattern of the telephone network is indicated in Figure VII - 1.

(1) *Extent of system.* The network of interurban lines is fairly extensive. There are almost as many exchanges as communes, but distribution is uneven, some communes having several exchanges, others none. Almost 1,800 telephones are scattered among a large number of rural communities. In 1941 there was a total of 35,000 telephone instruments in Bulgaria, less than one telephone for each two hundred inhabitants. Before the war, the government did not keep up with the demand for extension of telephone service to individuals, but gave more attention to improvement of long-distance lines. This tendency has been accentuated by wartime conditions. Long-distance lines have been constructed to serve Bulgaria's own needs in conquered areas and for her role as a key transit area between Germany and Mediterranean countries. Shortage of both apparatus and wire has precluded much other development, although the press periodically announces extensive plans. Recently private telephones not urgently needed have been confiscated for one year.

The extent of the telephone network is shown in Table VII - 3.

TABLE VII - 3

BULGARIA, EXTENT OF TELEPHONE NETWORK*

Length of urban aerial lines, 960 miles.	
Length of urban underground lines, 98 miles.	
Length of urban aerial wire, 12,698 miles.	
Length of urban underground wire, 27,618 miles.	
Length of interurban lines, 12,148 miles.	
Length of interurban wire, 49,682 miles.	
Number of real circuits on naked wire, 28,220.	
Number of phantom circuits on naked wire, 1,562.	
Number of carrier circuits on naked wire, 1,939.	
Number of real circuits in cable, 202.	
Number of interurban domestic circuits, 2,572.	
Number of interurban international circuits, 14.	

*The data on lengths of the network are dated 1939, those on numbers of circuits 1941.

(2) *Long-distance circuits.* The following are the important long-distance telephone circuits in operation and projected.

(a) *Sofiya/Ruse/Bucureşti, Rumania.* A three-circuit cable was projected in 1942, from Sofiya to Bucureşti, Rumania, via Ruse and Turtucaia on the Danube.

(b) *Sofiya/Edirne/Ankara, Turkey.* Until 1941, the normal route between Turkey and Germany was by way of Bulgaria and Yugoslavia. However, in the summer of 1941 Bulgaria notified the International Telecommunications Union that the route by way of Bulgaria and Rumania was being regularly used instead. In the summer of 1943 the Germans announced that a new direct telephone connection between Ankara and Berlin was about to be established and would make unnecessary the relay station in Sofiya formerly required because of the difference between the English telephone system used in Turkey and that of Central Europe. The new line was to have a number of conductors, operating on high frequency, including at least ten direct circuits between Sofiya and Istanbul, and was to utilize a submarine cable under the Bosporus. The route probably is by way of Edirne.

(c) *Sofiya/Petrich/Sérrai/Thessaloníki, Greece.* This is the principal pre-war route between Sofiya and Athénai (Athens), Greece.

(d) *Sofiya/Plovdiv/Xanthí, Greece.* In December 1942, a 15-circuit, high-frequency line was opened between Sofiya and Plovdiv. An eight-circuit cable from Plovdiv to Xanthí, to connect Sofiya with western Thrace, was under construction in July 1942. Plans for extensions from Xanthí to Kaválla, Greece, Komotiní (Giumiurdzhina), Greece, and Alexandroúpolis (Dedeagach), Greece, were reported in late 1942. A three-circuit cable from Plovdiv via Nevrokop to Sérrai, Greece, and Dráma, Greece, was also planned.

(e) *Sofiya/Niš/Beograd (Belgrad), Yugoslavia.* This is the trunk line between the Bulgarian and Yugoslav capitals.

(f) *Sofiya/Skoplje, Yugoslavia/Bitolj, Yugoslavia.* A cable with a number of conductors is reported in operation.

(g) *Sofiya/Trnovo,* with extensions to Shumen, Varna, and Dobrich (Bazargic) in the Dobrogea. This high-frequency line, with 15 circuits as far as Trnovo, was planned for immediate construction in 1942.

(h) *Sofiya/Stara-Zagora/Burgaz/Varna/Ruse; Sofiya/Vrattsa/Pleven/Ruse.* These were peacetime long-distance circuits between Sofiya and Eastern Bulgaria.

(3) *Repeater stations.* Pre-war repeaters were at Sofiya, Stara-Zagora, Gorna Orekhovitsa, Ruse, and Dobrich (Bazargic) in the Dobrogea (Dobrudja).

(4) *Location of lines.* Lines usually follow roads.

(5) *Automatic railroad dispatch system.* Centers for the automatic telephone dispatching system of the railroads are at Sofiya, Plovdiv, Gorna Orekhovitsa, and Mezdra.

B. Centrals.

(1) *Types of equipment.* Of the 969 exchanges in operation in 1941, eight were automatic and the remainder manual.

Automatic centrals were at Sofiya, Burgaz, Varna, Gabrovo, Ruse, and Stara-Zagora, but not all telephones in these cities are directly connected with automatic centrals. A modern dial exchange was also planned for Plovdiv, which has an antiquated 1,000-line manual exchange. In recent years, equipment has been supplied chiefly by Siemens-Halske. A decade ago, when all exchanges were manual and Sofiya had the only central battery in the country, equipment was of varied make: Siemens-Halske, Ericsson, Bulgarian Telegraphia, Deutsche Privat, Wipest, and others. At that time Siemens-Halske had supplied more than twice as much equipment as any other firm.

(2) *Number of lines.* In 1941 there were 35,000 telephones. In 1940 only 8,000 were automatic. In the fall of 1942 Sofiya had 14,000 lines, of which 8,000 were connected with a manual exchange, and 6,000 with six automatic centrals. Materials were on order for enlarging the system to 30,000 lines by the spring of 1944, but a shortage of material is reported.

The number of lines in the various automatic exchanges is given in Table VII - 4.

TABLE VII - 4
BULGARIA, TELEPHONE LINES IN AUTOMATIC EXCHANGES

	1938	1941
Varna	920	1,040
Stara-Zagora	340	—
Ruse	622	715
Gabrovo	400	—
Burgaz	664	—
Sofiya	—	11,686
Plovdiv	—	1,263

(3) *Carrier-frequency equipment.* High-frequency equipment has been used in Bulgaria since 1931.

C. Route equipment.

Lines are almost wholly aerial except for some large underground cables in cities. Aerial lines are mostly bare wire, copper or alloy in large towns and on important interurban lines, and galvanized iron in small towns and on minor interurban lines. The diameter of the wire varies. In large towns cables with a large number of pairs of conductors have impregnated paper and lead covering and may be set in concrete and masonry canals. Wires in cable are usually 0.6 millimeter in diameter, free wires are two millimeters.

D. Vulnerable features.

Damage to the few repeater stations, the trunk high-frequency lines and the important exchanges would interfere seriously with communications between Bulgaria and occupied regions and southern Europe.

74. Submarine Cable

The only submarine cable to Bulgaria was one from Odessa to Varna, inoperative in the years after the war of 1914–1918. A cable landing, presumably of this old cable, is reported at the west head of Varna Bay, east and somewhat north of the railway station and north of the harbor proper.

75. Postal Service

A. Extent of development of service.

Mail is distributed by train, bus line, carriage, and on foot. In 1939 there were 806 post offices (of which 156 were also telegraph offices), 793 postal agencies and mobile units, and 3,927 postal boxes. Length in miles of postal routes and total miles travelled in 1939 are shown in Table VII - 5.

TABLE VII - 5
BULGARIA, POSTAL ROUTES, 1939

	LENGTH OF ROUTES IN MILES	TOTAL DISTANCE TRAVELLED, MILES
Railroad	2,994	4,106,000
Road and path	14,712	4,027,247
Electric	5	10,707

In 1942, of 780 post and telegraph offices reported, five per cent were in postal buildings, 40 per cent in municipal buildings, and 55 per cent in private houses.

B. Type of service offered.

(1) *Regularity of deliveries.* Deliveries in cities normally are twice daily, in rural areas once a day to twice a week.

(2) *Registered and special deliveries.* Registered mail has been a regular service, but special delivery is a new development provided almost exclusively in the cities.

(3) *Airmail.* Airmail to and from Bulgaria has been handled by the German Lufthansa (daily flights to Bucureşti, Thessaloníki, Wien [Vienna]), and the Italian line (week-day flights to Rome). Domestic airmail service has been sporadic.

C. Reliability of system.

The Bulgarian postal system is regulated by international postal conventions and has been fairly efficient.

76. Railroads

A. Pattern of the system.

The density of railroads per square mile and per person is lower in Bulgaria than in the neighboring countries of Yugoslavia or Rumania, as well as lower than in most other European countries and the United States (Table VII - 20).* However, the rail net is fairly evenly distributed through the country so that few places are more than 20 miles from a railroad.

Heavy and speedy traffic cannot be handled efficiently, and the strategic value of the system is limited. Most Bulgarian railroads were built cheaply in the first place, and comparatively small funds have been available for subsequent maintenance and construction. The extensive use of compulsory labor has not been very efficient. Many difficult engineering problems have not been solved.

The backbone of the rail net is a fairly even grid of two main east-west lines and three north-south connections. The main rail focus is Sofiya, in the west-central part of the country. From Sofiya a line runs north and east along the north flank of the Stara-Planina (Balkan Mountains) to con-

*Tables VII - 16 to VII - 38 will be found on pages VII - 27 through VII - 39.

nect with Ruse on the Danube River and Varna on the Black Sea and forms the northern line of the grid (lines 2 and 19 on Figure VII - 2).*

A second line (line 1), runs south and east along the south flank of the Stara-Planina to Turkey, with a branch to the Bulgarian port of Burgaz on the Black Sea (line 12). This line (line 1) is the main artery of Bulgaria and forms a part of the Orient Express line between western Europe and Istanbul, Turkey.

Additional north-south lines and branches round out the network (Figure VII - 2). Important among them is the Sofiya/Struma Valley line in the west (line 3). The Sofiya/Pernik section of this route carries Bulgaria's heaviest lignite coal traffic.

New lines are under construction, the most important being the link between existing sections of the Sub-Balkan east-west line (5, 11) midway between the two main east-west routes. It will connect Sofiya with Burgaz and Varna.

A feature of the Bulgarian net is the scarcity of connections to neighboring countries. Except for the important Orient Express route, the only through connections are in the northeast through the Dobrogea to Rumania, the train ferry across the Danube at Ruse (interrupted in winter by ice), and a narrow-gauge connection down the Struma Valley to the Aegean and Thessaloníki. This latter connection is now being converted to standard gauge. Because of Bulgaria's location the country controls the only good rail connection between western Europe and Turkey. If the new borders of the country are considered, it controls the connections to Greece and the whole Aegean area as well.

B. Administration.

(1) ***Bulgaria proper.*** Bulgarian railroads are owned and operated by the government. There is one 11-kilometer (7-mile) stretch of privately owned line, but it is operated by the National Railroads. However, there are 72.1 kilometers (45 miles) of private track used as connecting links between private sidings in various industrial plants and in mines.

The Bulgarian National Railroads (Bulgarski Durzhavni Zheleznitzi) are under the general supervision of the Minister of Railroads, Posts and Telegraphs. The Director General of Railroads and Ports, with headquarters in Sofiya, is in charge of management. At present, the Director General is Eng. Georgi Popov, who took office in 1942. The railroads are autonomous in many respects. An administrative council, consisting of the Director General and the higher railroad officials, has only consultative functions. The headquarters of the Directorate General include the usual departments and services.

Regional Inspectorates are operated in Sofiya, Plovdiv, Gorna Orekhovitsa, and Dupnitsa. It is not known what authority has been delegated to them.

(2) ***Border areas.*** At present the National Railroads also operate newly acquired lines in the former Yugoslav, Greek and Rumanian territories. Two new inspectorates were established in Skoplje and Xánthi (Ksanti). In the southeastern border area, management is divided between the Bulgarian and Turkish railroad administrations. The Pithion/Alexandroúpolis line is operated by the Bulgarian railroads, whereas the Svilengrad/Pithion section is operated by the Turkish railroads, as a part of the Svilengrad/Istanbul line. This includes the Edirne area, where a new stone bridge is being built across the Maritsa River.

(3) ***German control.*** German authorities exercise an important influence upon Bulgarian railroad affairs. German liaison officers are located at strategic points, and German railroad officials are working at headquarters as observers, to insure railroad management in the German interest.

(4) ***Personnel.***

Railroad employees numbered 17,517 in 1938. The division of their functions may be seen in Table VII - 6.

TABLE VII - 6
BULGARIA, FUNCTIONAL DIVISION OF RAILROAD EMPLOYEES, 1938

Division	Number
Administration	539
Maintenance of way and structures	4,705
Station service	3,702
Train crews	1,904
Locomotive crews	2,745
Maintenance of equipment	724
Major workshops	2,851
Others (stores, etc.)	347

In recent years, personnel has increased because of the operation of new lines. Skilled railroad men have probably been replaced by less experienced workers. Very unfavorable criticism of the efficiency of Bulgarian personnel was reported in 1920. However, special efforts have reportedly been made

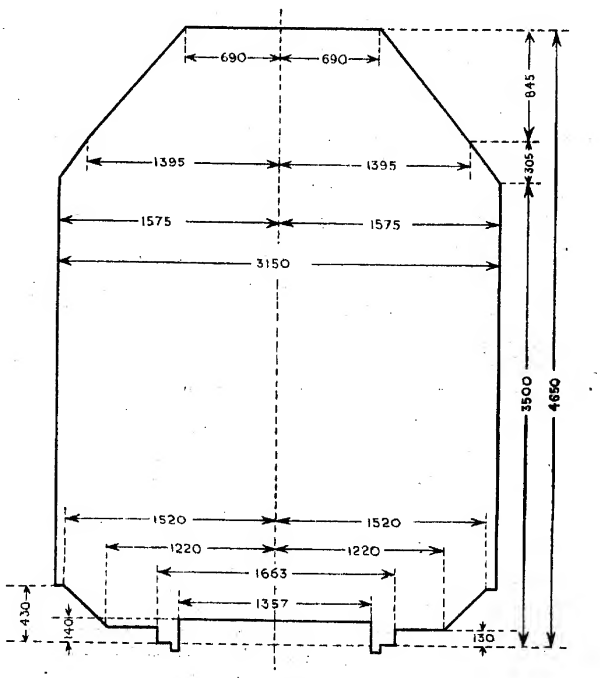


Illustration VII - 1.
Clearance standard. Standard-gauge Bulgarian State Railways. (Dimensions in millimeters.)

*On Figure VII - 2, Plan VII - I and Tables VII - 16 to VII - 38, railroad lines are numbered to correspond with numbers in the text. Line numbers 1–20 refer to principal lines; 101–117, to other standard-gauge lines; 201–210, to narrow-gauge lines; 301–312, to international connections. 401–413 lines under construction, and 501–508 projected lines, are not shown on Figure VII - 2.

by the railroad administration to improve the training of railroad personnel. A school for various groups of employees was established and it can be assumed that this has had favorable results. But it is hardly to be expected that the personnel standards of the large European railroad systems have been attained.

C. Track and right-of-way.

(*1*) ***Clearance.*** The clearance of Bulgarian standard-gauge railroads is the same as standard-gauge clearance in other parts of Europe (Illustration VII - 1).

(*2*) ***Gauge.*** Most lines are standard-gauge, 1.435 meters (four feet, eight and one-half inches). There are, however, some narrow-gauge lines. Table VII - 7 gives the lengths of standard- and narrow-gauge lines.

TABLE VII - 7
BULGARIA, LENGTH OF STANDARD AND NARROW-GAUGE RAILROAD LINES

	KM.	MILES	PER CENT OF TOTAL LENGTH OF LINE
Length of standard-gauge lines.....	3,173	1,971	87.2
Length of narrow-gauge lines			
76 cm. (2 feet, 6 inches).....	236	148	6.5
60 cm. (1 foot, 11.6 inches).....	227	142	6.3
Total narrow-gauge lines.....	463	290	12.8
Grand total.....	3,636	2,261	100.0

(*3*) ***Track operated.***

(*a*) *National lines.* All lines in Bulgaria are single-track with the exception of a few short double-track sections around Sofiya. These have a total length of 31 kilometers (20 miles) or less than one per cent of the total length of line (Table VII - 16; Figure VII - 2).

Double-tracking of the Ruse/Varna line was reported in progress under German direction in 1940. However, it is not possible to verify this report. In addition, the double-tracking of several sections of the principal lines is projected; among them are Caribrod/Slivnitsa (line 1) (37 kilometers; 23 miles); Novoseltsi/Belovo (line 1) (69 kilometers; 43 miles); Sofiya/Mezdra (line 2) (87 kilometers; 54 miles); and Sofiya/Vladaya (line 3) (18 kilometers; 11 miles).

Length of sidings and additional tracks in Bulgaria is comparatively small. The total length of track in 1938 was 4,239 kilometers (2,634 miles), only 117 per cent of the total length of line. Corresponding ratios for other railroad systems are shown in Table VII - 8.

TABLE VII - 8
OTHER COUNTRIES, LENGTH OF TRACK COMPARED TO LENGTH OF LINE

RAILROADS	PER CENT
Italian National	184
German National	226
Rumanian National	139
Yugoslav National	133
United States	
(a) Eastern District	214
(b) All Districts	168

Sidings in many way stations are too short to accommodate long trains. An older source stated that sidings were available at all stations on standard-gauge main lines, and that they had a standard length of 500 meters (547 yards) between the switches at each end. In that case, the useful length of sidings would be about 400 meters (approximately 440 yards). Between Ruse and Gorna Orekhovitsa (line 17), at all stations sidings 457 meters (500 yards) long are available.

(*b*) *Private sidings.* In 1938, 74 private sidings, with a total length of 50,328 meters (55,059 yards), were reported on standard-gauge lines and six private sidings, with a total length of 1,056 meters (1,155 yards), on narrow-gauge lines (Table VII - 21).

(*4*) ***Motive power.***

(*a*) *General.* At present all railroads are steam-operated. The Bulgarian Ministry has recently announced that a 20-year plan for electrification is being prepared in order to save consumption and transportation of coal. The most important lines would be electrified first. It has been reported that the short stretch between Sofiya and Voluyak (section of line 1) and the branch to Bankya (line 103) has already been electrified.

(*b*) *Fuel.* In 1939 locomotives fuel consumption was 657,000 metric tons (724,000 short tons). Only domestic fuel was used, mostly lignite from Pernik (Figure VII - 3). The lignite was rated at 4,200–5,000 calories per kilogram (7,560–9,000 B.Th.U. per pound). In addition, several thousand old ties were used for locomotive fuel. The quantity of gasoline required for the few rail cars was negligible. It can be assumed that some stocks of lignite are available in the principal roundhouses. There is no indication that mechanical coaling equipment is available anywhere.

(*c*) *Lubricants.* About 2,000 tons of lubricants were used in 1939. As in all Axis-dominated countries in recent years, Bulgarian supplies of lubricants are small and of poor quality.

(*d*) *Water.* Water supply is inadequate and systems are poor. In many regions, water supply is insufficient, particularly in the area north of the Stara-Planina, where steep grades require comparatively large consumption. A Bulgarian survey of the water supply, made in 1935, reported that of 103 water stations, 92 had sufficient and 11 insufficient supply. It also stated that good water of less than 110 p.p.m.* was available at 76 stations, while in the 27 remaining stations, the water was too hard. The hardest water (500 p.p.m.) was found in Karnobat. Apparently there are no water-softening plants. Many reservoirs for water columns are old, and built at a height of only 16–20 feet above the rails, and therefore have insufficient pressure for quick filling of locomotives.

The maximum distance between water stations is usually 20 to 30 miles. However, one line of 39 miles has no water station (Table VII - 23). Inadequate water supply must make efficient operation very difficult.

(*5*) ***Ballast and standards of roadbed construction.*** Roadbeds are weak and inadequate. In initial construction apparently no efforts were made to move great quantities of earth to improve the subsoil where this was advisable. Ballast is also relatively light.

The usual measurements of the roadbed are shown in Table VII - 9.

TABLE VII - 9
BULGARIA, MEASUREMENTS OF ROADBED

	METERS	FEET
Formation width.....	5	16.4
Width of ballast at platform.....	3.00–3.40	9.8–11.2
Depth of ballast.....	.35	1.2

*Parts per million of mineral content. 1 p.p.m. = 0.1 French degrees. Water of 100 p.p.m. is considered too hard in the United States.

Crushed stone and gravel 30–60 millimeters (1.2 inches–2.4 inches) in diameter is used as ballast. Suitable material is available, for there are many quarries throughout the country which can supply the railroads. The principal quarries equipped with crushing machinery are at Dragoman, at Sestrimo, at Iskr (line 1), and at Stoichevtsi (line 110). There is a plant for producing sand and gravel ballast at Podueni, near Sofiya (line 1).

(6) *Ties.*

(*a*) *Wooden ties*. Oak and beech ties are used. About 500,000 ties are required every year. The railroad personnel cut the ties with the help of compulsory labor service. The wood supply in Bulgaria is sufficient for this. Length of ties is 2.50 meters (8.1 feet), width, .26 meter (.85 inch), and height, .15 meter (.39 inch).

Oak ties are not treated. Beech ties are first treated with a small amount of zinc chloride and then with a greater volume of creosote. Plants for this treatment are located at Belovo (line 1), at Sindel (line 116) and at Preslav (line 115).

(*b*) *Steel ties*. Steel ties are used on the following sections: Caribrod/Plovdiv (line 1), Sofiya/Gorna Orekhovitsa (line 2), and Sofiya/Pernik (line 3). The usual weight of steel ties is 56 kilograms (124 pounds).

(*c*) *Spacing of ties*. There are 25 ties for each 18-meter (59-foot) length of rail, or 42 ties per 100 feet of track. Where 18-meter rails are laid, the space between the adjoining ties at section joints is 250 millimeters (9.9 inches). The space between the first and second ties from the joints is 627 millimeters (24.8 inches), and that between the second and third ties is 750 millimeters (29.6 inches). Where 15-meter (49-foot) rails are laid, the space between the adjoining ties at section joints is 530 millimeters (20.9 inches). The space between the first and second ties is 693 millimeters (27.3 inches), and that between the second and third ties, 770 millimeters (30.3 inches). All these measurements are taken from center to center of the ties. Maximum number of ties is 1,334 per kilometer (2,148 per mile).

(7) *Rails.*

(*a*) *Type and weight*. Three types of rails are used on standard-gauge lines. The heaviest type (first class) weigh only 41 kilograms per meter (82 pounds per yard). Second-class rails weigh 35 kilograms per meter (70 pounds per yard). Third class weigh 31 (62 pounds per yard) or 32.5 kilograms per meter (65 pounds per yard).

Dimensions of first- and second-class rails are shown in Table VII - 10.

TABLE VII - 10
BULGARIA, DIMENSIONS OF FIRST- AND SECOND-CLASS RAILS

	First class		Second class	
	MM.	INCHES	MM.	INCHES
Height	72	2.8	59	2.3
Width of head	138	5.4	131	5.2
Width of web	14	0.6	13	0.5
Width of base	110	4.3	110	4.3

In 1934, only 16 per cent of the total length of track was laid with 82-pound rails, 12 per cent with 70-pound, and 72 per cent with rails of less than 70 pounds. In 1938, 82-pound rails had been laid on the following sections: Caribrod/Belovo (line 1); Sofiya/Pernik (line 3); Sofiya/Kozarevets and Asenovo/Kaspichan (line 2); and Plachkovtsi/Dubovo (line 17). It is not known whether first-class rails have been laid on other lines in recent years.

On narrow-gauge lines, rails weigh 20 and 9.5 kilograms per meter (40 and 19 pounds per yard) for 76-centimeter (two feet, six inches) and 60-centimeter (one foot, 11½ inches) gauge, respectively.

(*b*) *Fastening of rails and joints*. Rails are fastened to the ties by plates, screws, and bolts of several types. Plates are also used at the joints. On first-class rails, the joints have four to six bolts. Joints are squared, i.e., the joints of the two rails are opposite each other rather than staggered, as in the United States.

(8) *Maintenance of way and structures.* The condition of the lines is poor. In addition to the constructional weakness of the roadbed and the extensive use of light rails, re-laying of rails was often postponed even when rails were in very bad condition. The age of the rails (outside of tunnels) is shown in Table VII - 11.

TABLE VII - 11
BULGARIA, AGE OF RAILS, 1933–34

Age	Per Cent
Less than 5 years	16.8
5–10 years	10.3
10–15 years	13.6
15–20 years	4.8
More than 20 years	54.5

From 1920–1937, sections totalling 793.3 kilometers (493 miles) were re-laid. This was only 44 kilometers (27 miles) per year or 1.8 per cent of the average length of line during that period. The minimum should have been 2.5 per cent.

Stocks of track material made of steel are probably very small, since all steel must be imported. Ballast and wooden ties, however, are available in adequate quantities.

Varying climatic conditions make for special maintenance problems in the different parts of the country. In winter, heavy snowfall occurs in the region north of the Stara-Planina. On Sofiya-Varna line and its branches snow depths are reported as ranging up to 14.5 feet. In one instance, snow depth on a line running in a cut was 23 feet.

Snow fences, usually made of used ties, are built where needed. In 1939 one snowplow was in operation as a special unit. However, the Germans have lent a number of snow plows driven by Diesel engines to the Bulgarian railroads. In general, it is possible to keep all main lines open in winter.

Many rivers are poorly regulated and sometimes flood the railroads where they run through valleys. Washouts are often caused by sudden thunderstorms in mountainous areas. Landslides also frequently block traffic.

(9) *Axle loads.* According to the *Achsdruckverzeichnis* (list of axle loads) of the *Verein Mitteleuropäischer Eisenbahnverwaltungen* (Association of Central European Railroads), a maximum axle load of 17 metric tons is permissible on only a few lines or sections of lines. The maximum permissible axle load is 14 tons on all other standard-gauge lines (Table VII - 16).

(10) *Grades and curves.* The mountainous character of the country has made railroad building extremely difficult and little effort has been made to avoid steep grades. The ratio of level sections is comparatively small, and that of sections with steep grades is high. This is indicated by Table VII - 22, which also illustrates the low percentage of level sections in Bulgaria in comparison with other countries. The same

(*Continued on page VII - 10*)

Illustration VII - 2. Cherepich Bridge.
Bridge over Iskr River, near Mezdra; railway tunnel at right. (Bridge 20, line 2.)

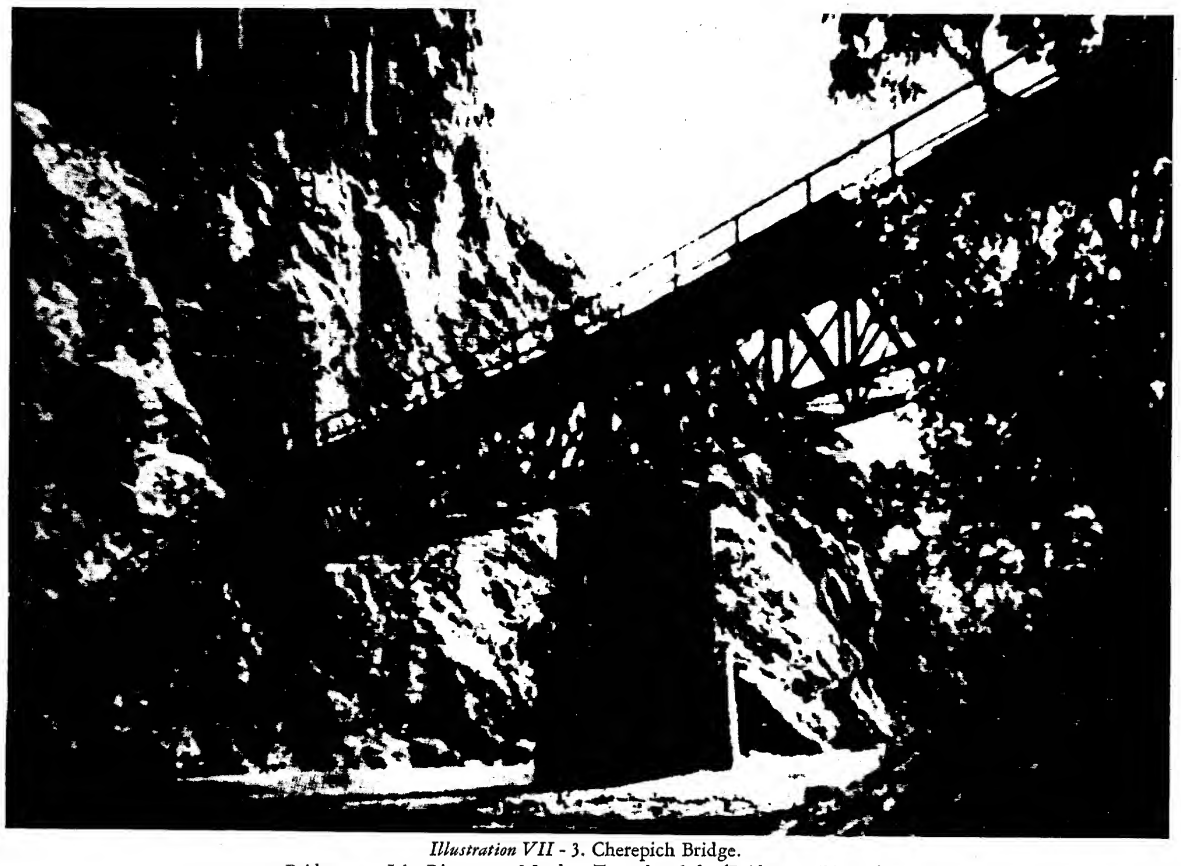


Illustration VII - 3. Cherepich Bridge.
Bridge over Iskr River near Mezdra. Tunnel at left. (Bridge 20, Line 2.)

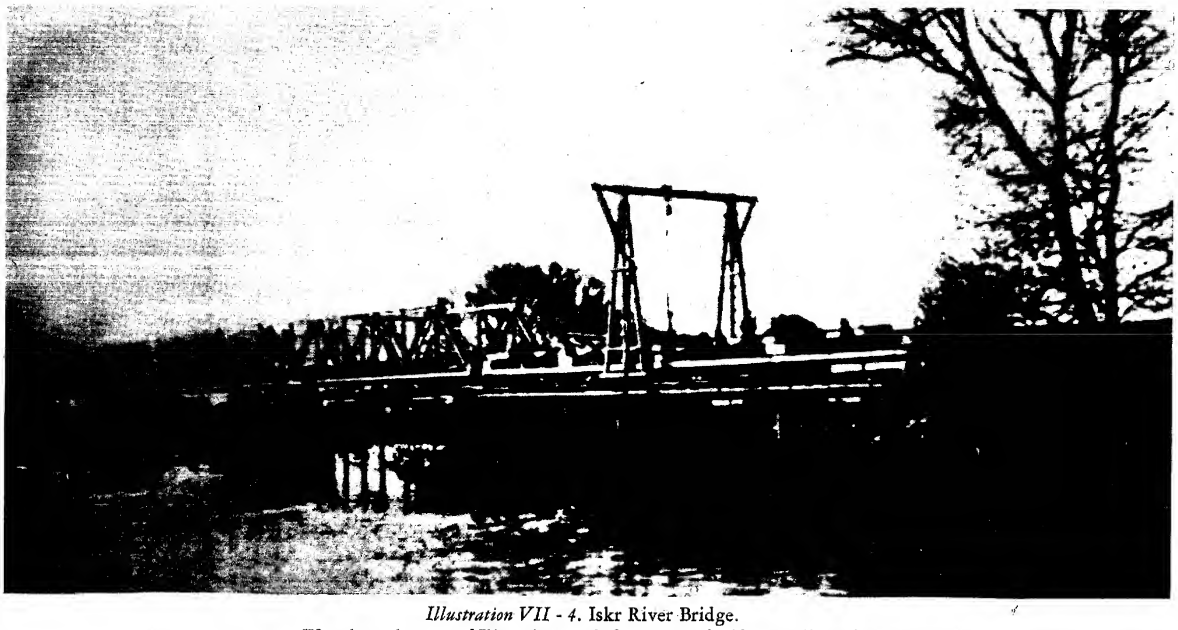


Illustration VII - 4. Iskr River Bridge.
West branch, east of Ilientsi, near Sofiya. 1931. (Bridge 29, line 5.)

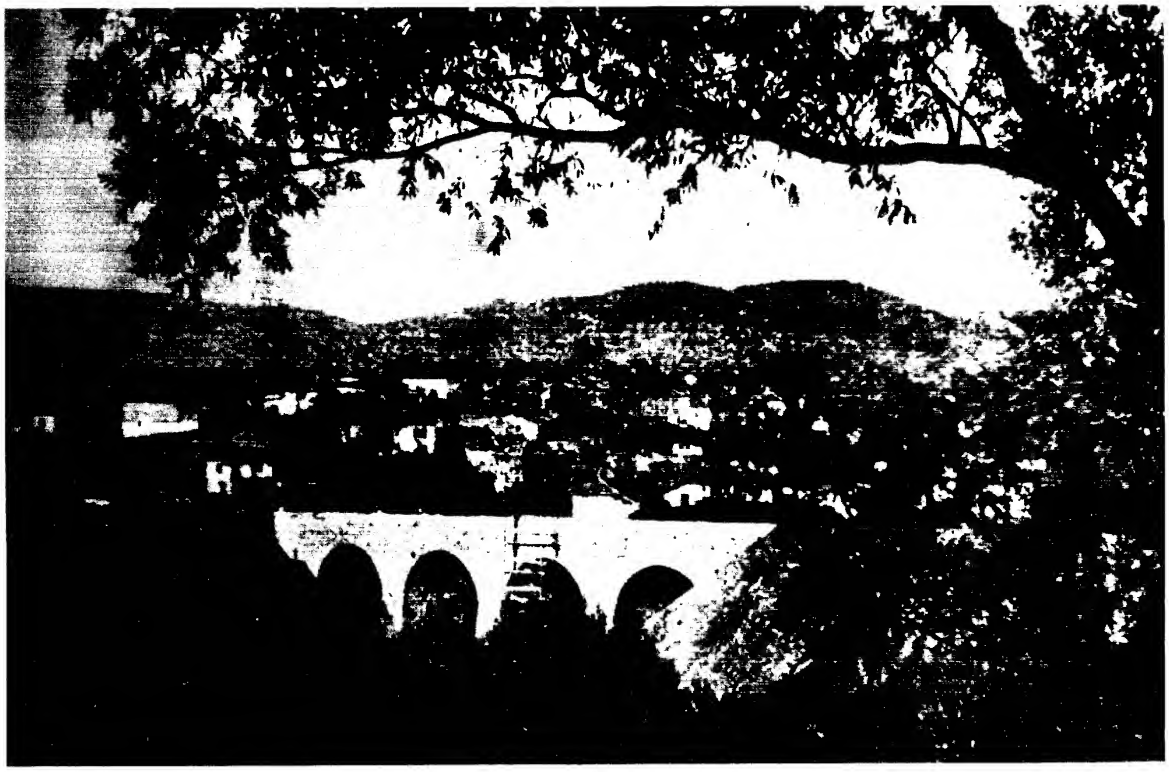


Illustration VII - 5. Stone arch Bridge at Makotsevo.
Over the Makotsevo River on the Ilientsi/Makotsevo Route. 1931. (Bridge 29 (a), line 5.)

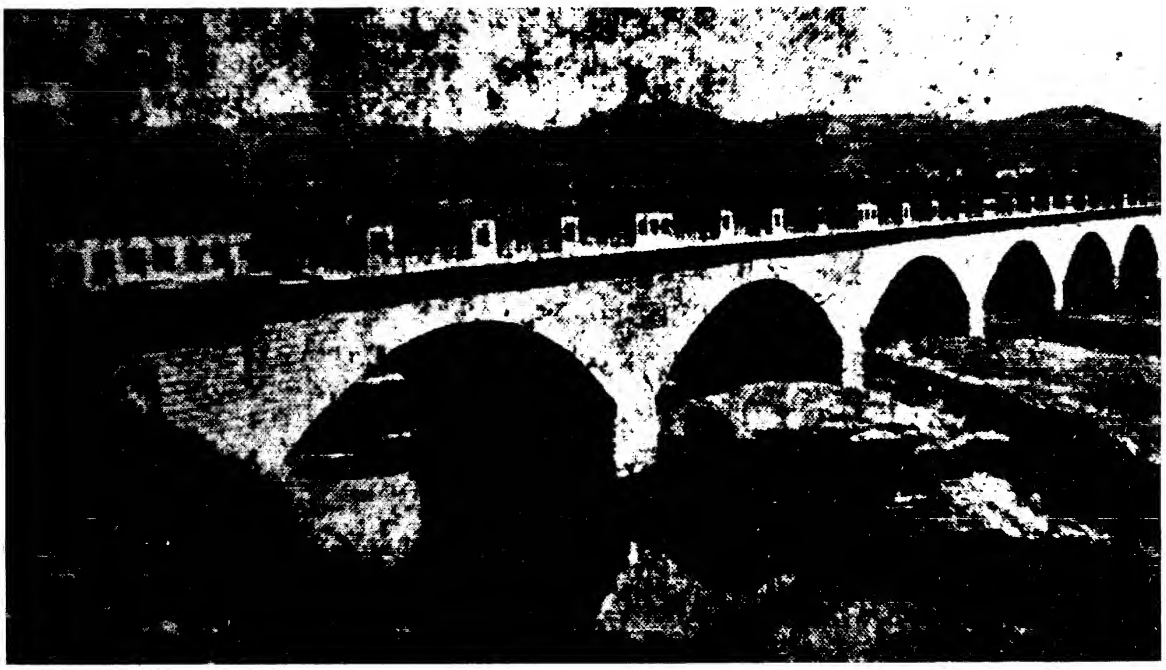


Illustration VII - 6. Bridge over Arda River.
Railroad and highway bridge southeast of Krdzhali. 1931. (Bridge 33, line 15. Also Illustration VII - 25.)

Illustration VII - 7. Syuyutliika River Bridge.
North of Momchilgrad. (Bridge 34, line 15.)

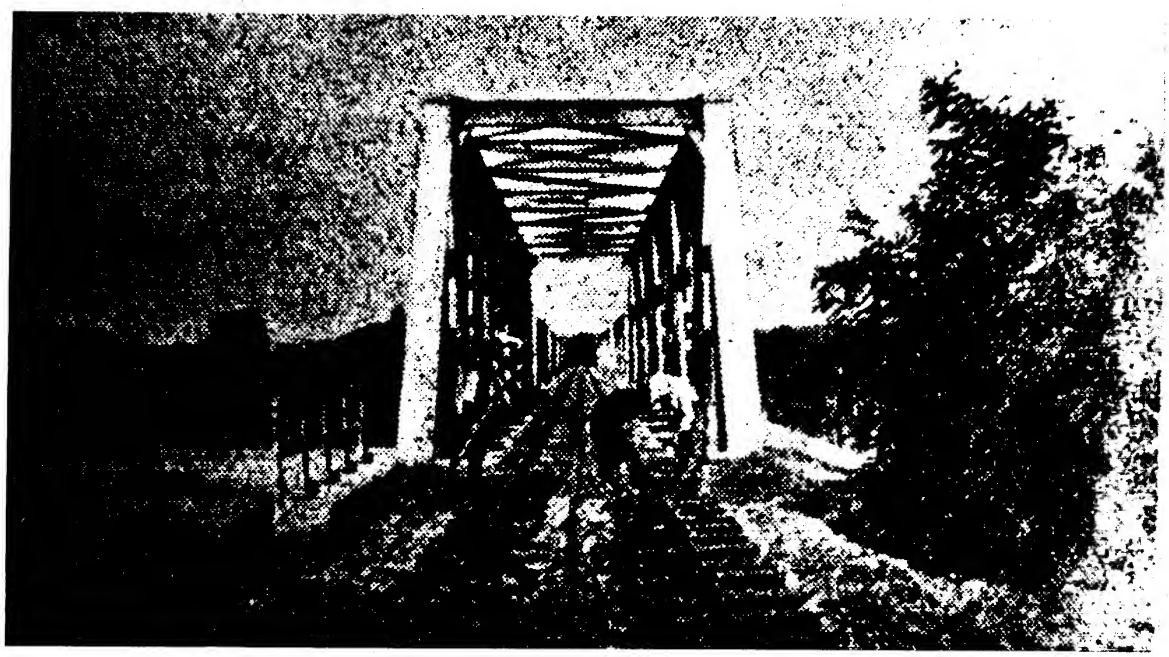


Illustration VII - 8. Steel bridge over Maritsa River.
Near Rakovski on the Mikhailovo/Rakovski route. 1936. (Bridge 35, line 16.)

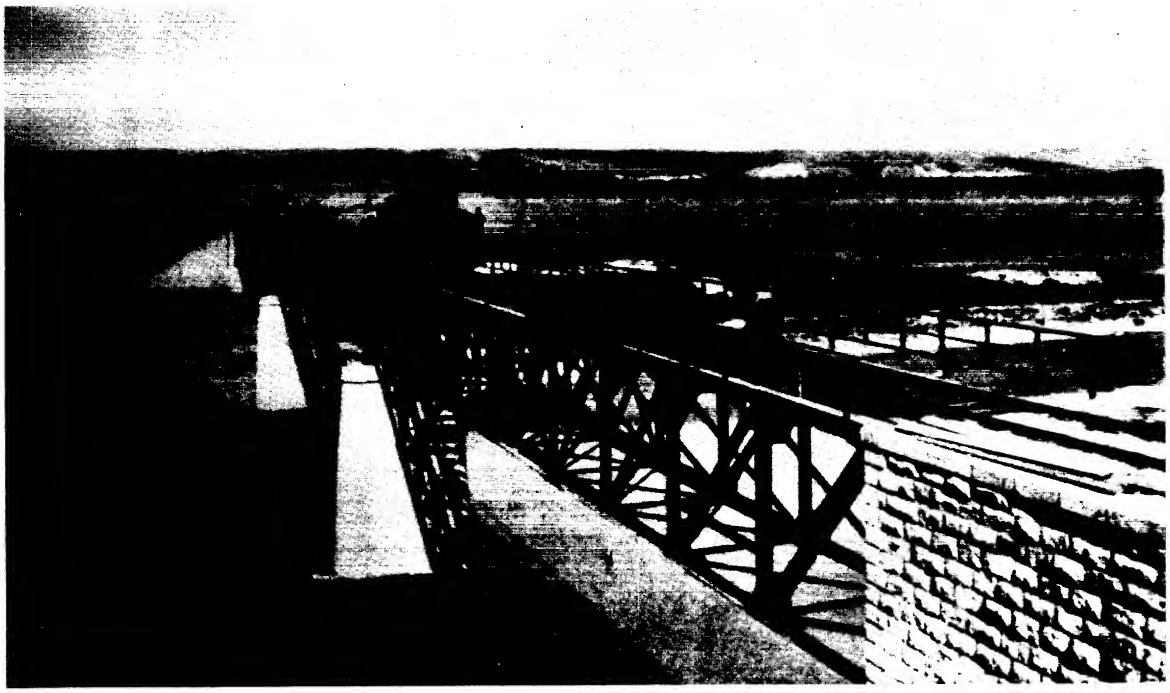


Illustration VII - 9. Yantra Bridge near Bela.
Looking westward. 1917. (Bridge 36, line 17.)

Illustration VII - 10. Railroad Bridge at Trnovo.
Looking west at north bridge over Yantra River. 1917. (Bridge 37, line 17.)

Illustration VII - 11. North railroad bridge at Trnovo.
Train crossing the Yantra River. Tunnel right foreground. (Bridge 37, line 17.)

Illustration VII - 12. South railway bridge at Trnovo.
Looking east at railroad bridge at left and highway bridge at right, over the Yantra River.
(Bridge 38, line 17. See Illustrations V - 13 and V - 14.)

situation is revealed by examining the grades of the individual lines (Tables VII - 16, 17, 18). There are also a great many curves on Bulgarian lines (Table VII - 24).

(11) *Bridges and tunnels.* Because of mountainous terrain and numerous streams, bridges and tunnels are numerous.

(a) *Bridges.** In 1939, a total of approximately 8,300 bridges was listed. A large number are on the routes radiating from Sofiya: the lines through Caribrod and Sofiya (line 1);** through the Iskr Valley; between Sofiya and Cherven-Breg (line 2); and through the Struma Valley, between Sofiya and Petrich (lines 3, 203). The Ruse/Momchilgrad route (lines 15, 16, 17), extending from north to south, and crossing the Stara-Planina and the Rodopi Planina, also has a large number of bridges.

The principal bridges are of steel or iron, and rest on concrete or masonry piers. In general, they are of simple truss construction, but in the Iskr River Gorge and in the more mountainous sections, a rectangular truss is used, with tracks running on top. (See Illustration VII - 2.) All bridges are single track, except for the Maritsa bridge at Kostenets. In the area where wood is readily available, minor bridges may be wooden. Maximum axle load of most bridges on standard-gauge lines is between 18 and 22 metric tons.

The problem of Danube crossings has often been discussed, but little action has been taken. However, in 1942, Bulgaria and Rumania, under German pressure, agreed to construct a bridge between Ruse and Giurgiu. It was to be completed by 1948. Work is still confined to clearing the approaches. In the meantime ferry service is maintained, although interrupted by ice in winter.

(b) *Tunnels.*† Tunnels are most numerous on three routes: the Ruse/Momchilgrad route (lines 15, 16, 17), where there is a series of bridges and tunnels (Illustration VII - 13); the Sofiya/Cherven-Breg section (line 2), through the Iskr Valley, and in the Struma Valley on the Sofiya/Petrich route (lines 3, 203). The longest tunnel in the Balkans is the 3,700-foot tunnel north of Krdzhali on the Ruse/Momchilgrad route. There are no tunnels on the main Caribrod/Svilengrad line (line 1).

(12) *Signal system.* All stations are connected by telegraph or telephone, and manually operated semaphores are used on main lines. In 72 stations, modern electric safety devices, which probably include interlocking of signals and switches, have been installed. An automatic or semi-automatic block system has been installed between Sofiya and Kunino (line 2). Long distance telephone connections between various large stations are used for centralized dispatching of trains.

(13) *New construction.*‡ The railroad system has been considerably expanded since the first World War. In the twenties, new branch lines were built, but in the thirties, the government engaged in more far-reaching projects. The Shumen/Karnobat line (line 18) was opened for traffic in 1941. At present, the standard-gauge Struma Valley and the Sub-Balkan routes are the most important lines under construction, but work is also progressing on other lines. In addition, a series of new construction projects has been approved by the National Assembly but no work will start on most of these projects in the near future.

D. Equipment.

(1) *Supply.*

(a) *Locomotives.* In 1938, there were 593 locomotives, of which 482 were standard gauge and 111 narrow gauge. Most were built in Germany, but some were purchased from Czechoslovakian, Polish, and British manufacturers. Average age of standard-gauge locomotives was 22.4 years; 112 were acquired prior to 1911, and 190 between 1911 and 1920; 124 were 1921–30 models and 56 were acquired after 1931. As Tables VII - 25 to VII - 28 indicate, a small number of powerful units was available, but in general, locomotives were far below modern standards (Illustrations VII - 15 to VII - 22).

In recent years, considerable sums have been appropriated for purchase of locomotives, but it is not certain how many units have been delivered. Those added to the existing stock after 1938 were fewer than those which had to be retired. At one time Germany leased locomotives to Bulgaria, but it is reported that these have been recalled. A limited number of locomotives were received from the recently annexed portions of Yugoslavia and Greece. Since service must be maintained on the annexed lines, the general locomotive position has not been improved, and a considerable shortage is reported.

(b) *Railcars.* In 1938, four Diesel railcars were available (Table VII - 25).

(c) *Passenger cars.* In 1938, the railroads owned 709 passenger cars, of which 589 were standard, and 120 narrow gauge. Average seating capacity was 53.6 and 24.5, respectively (for details see Tables VII - 27 and VII - 29). Since no delivery of new cars is reported, it is certain that the number of cars has decreased since 1938, due to retirements, even though a limited number of cars is built in the country. The supply of passenger cars, however, is adequate for present traffic, since passenger train services have been restricted.

(d) *Baggage cars.* In 1938, there were 295 baggage cars (Tables VII - 27 and VII - 30). The situation in regard to baggage cars is similar to that of passenger cars.

(e) *Freight cars.* In 1938, 10,897 freight cars were available; of these 9,583 were standard gauge, and 1,314, narrow gauge. Included are 466 units, which were owned by private enterprises, but operated on the national railroads.

Practically all freight cars are of the two-axle type; the average number of axles per car for all cars in the country is only 2.03. The average loading capacity of all cars owned by the national railroads is 16.2 metric tons (17.6 short tons). (For details see Tables VII - 31 and VII - 32.)

As in the case of locomotives, considerable appropriations were made for the acquisition of new freight cars and orders for several thousand cars were placed in Germany and Czechoslovakia. It is unlikely that any large quantities were delivered, since German railroads have retained almost the complete output of the plants for their own heavy demand. On the other hand, necessary retirements have decreased the available number of freight cars. Some freight cars were allocated to Bulgaria when it acquired lines from neighboring coun-

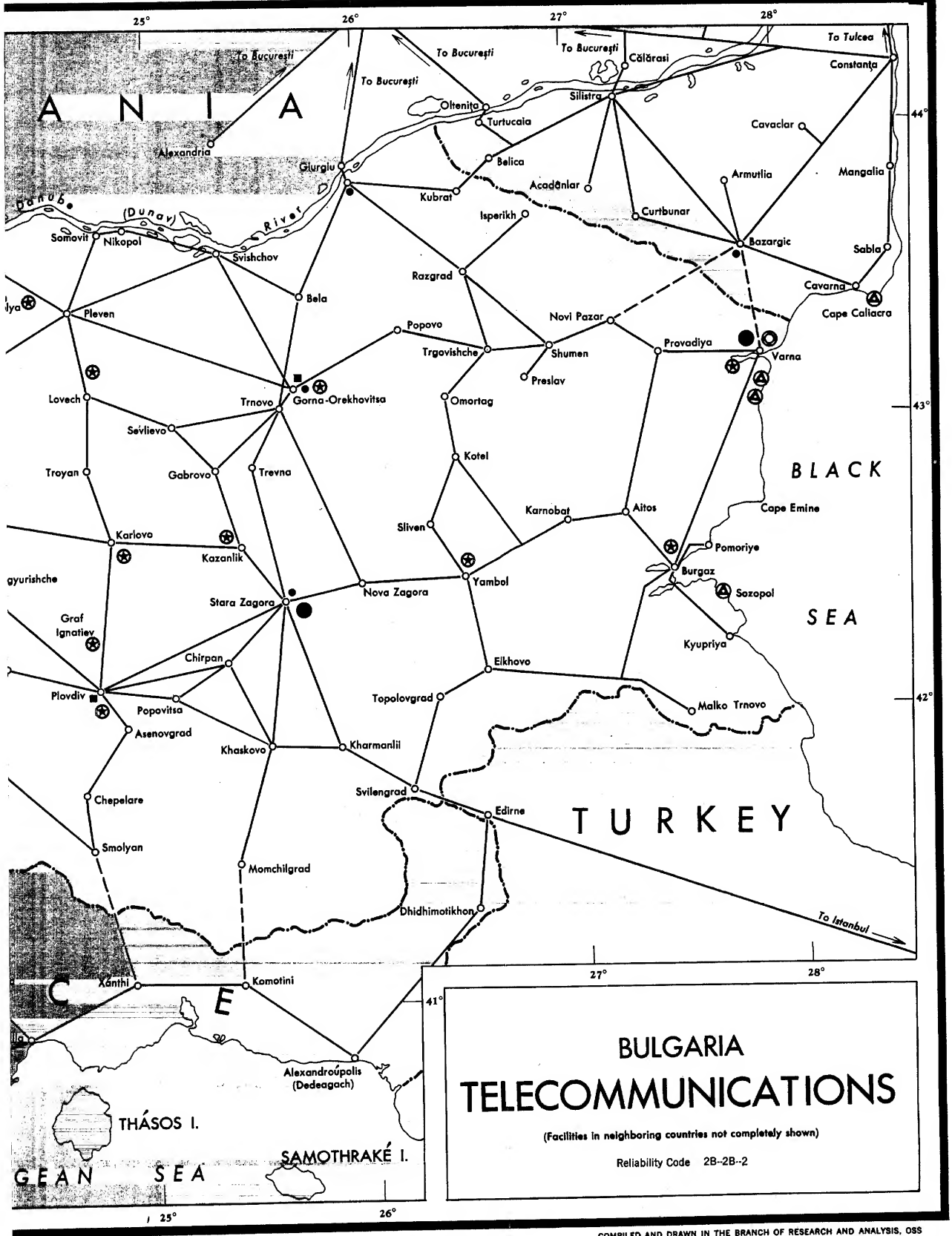
*Detailed descriptions of the main bridges on the principal lines, selected on a basis of length (in general over 100 feet) or of strategic location, are given in Table VII - 37. Bridges are shown on Figure VII - 2; also Illustrations VII - 2 to VII - 12.

**An important bridge, the Pobit Kamik Viaduct on line 1, between Milkovitsa and Vakarel, has recently been converted into an embankment.

†Detailed descriptions of the main tunnels on the principal lines are given in Table VII - 38 and locations of the tunnels shown on Figure VII - 2.

‡Progress on lines under construction as well as principal new projects are described in Topics 76 - I and J; see also Plan VII - I.

Figure VII-1
JANIS NO. 38
CONFIDENTIAL



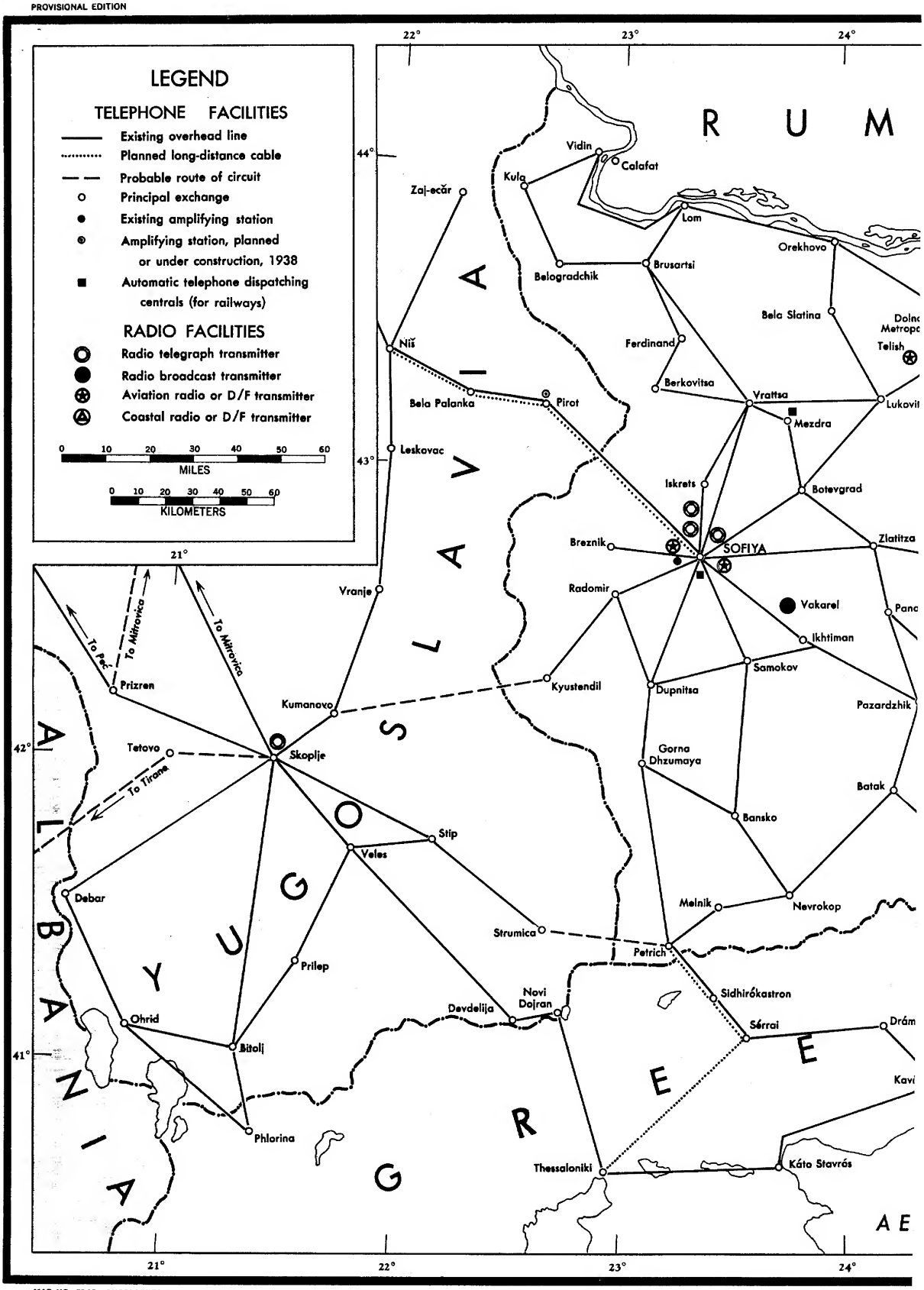
BULGARIA
TELECOMMUNICATIONS

(Facilities in neighboring countries not completely shown)

Reliability Code 2B--2B--2

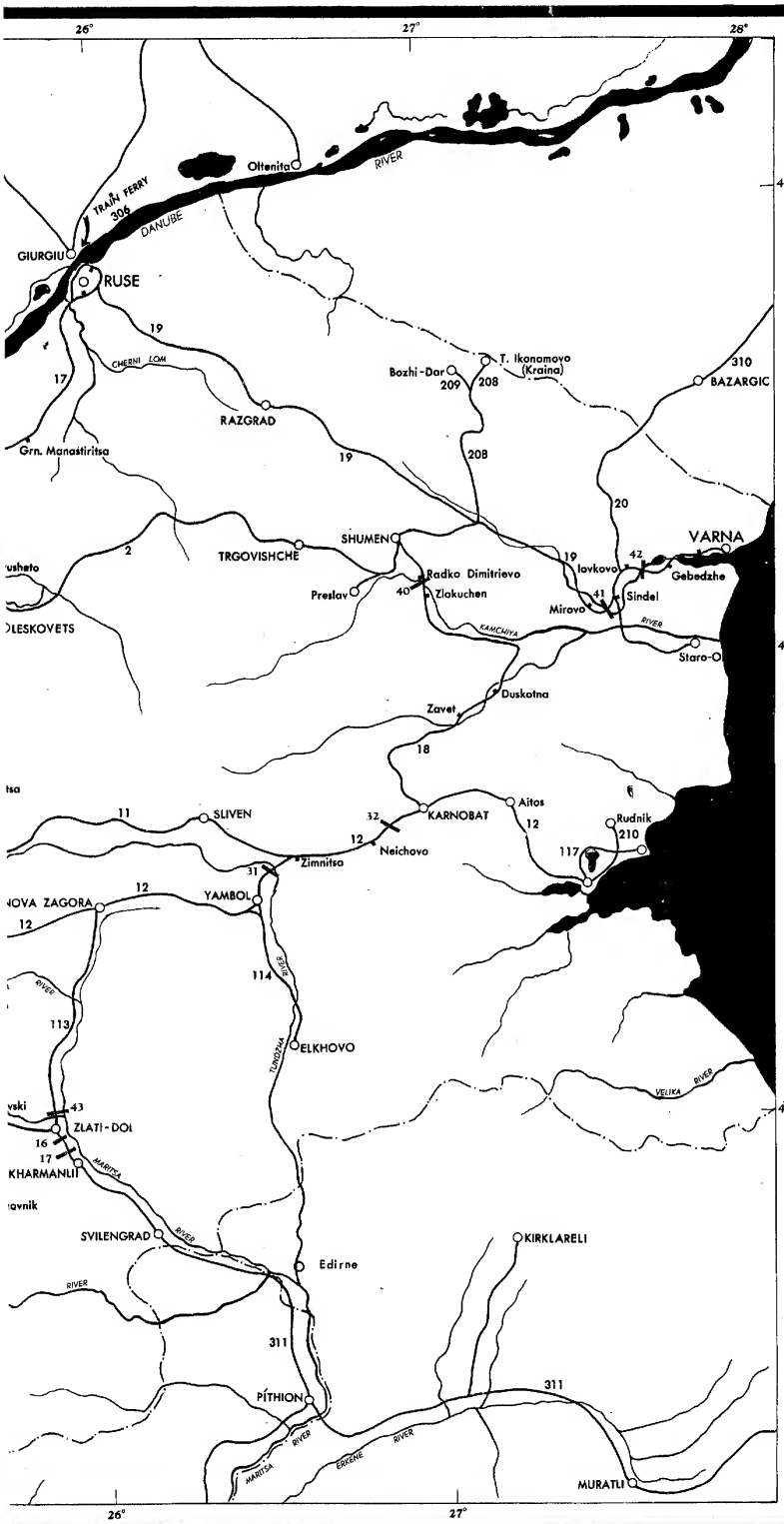
COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

PROVISIONAL EDITION



MAP NO. 2568 (SUPERSEDES MAP NO. 1055)
30 AUGUST 43

Figure VII-2
JANIS NO. 38
CONFIDENTIAL



BULGARIA

SELECTED RAILROAD

BRIDGES AND TUNNELS

——— RAILROAD

LINES NUMBERED 1-20 ARE PRINCIPAL NATIONAL LINES; 101-117, OTHER STANDARD GAUGE NATIONAL LINES; 201-210, NARROW GAUGE NATIONAL LINES; 301-312, INTERNATIONAL CONNECTIONS.

THE SMALL BLACK SQUARES INDICATE ON WHICH SIDE OF THE TRACKS THE SELECTED STATION BUILDINGS ARE LOCATED.

LINES UNDER CONSTRUCTION OR PROJECTED ARE NOT SHOWN.

10 PRINCIPAL BRIDGE LOCATIONS; THE CORRESPONDING NUMBERS REFER TO DESCRIPTIONS IN TEXT.

11 PRINCIPAL TUNNEL LOCATIONS; THE CORRESPONDING NUMBERS REFER TO DESCRIPTIONS IN TEXT.

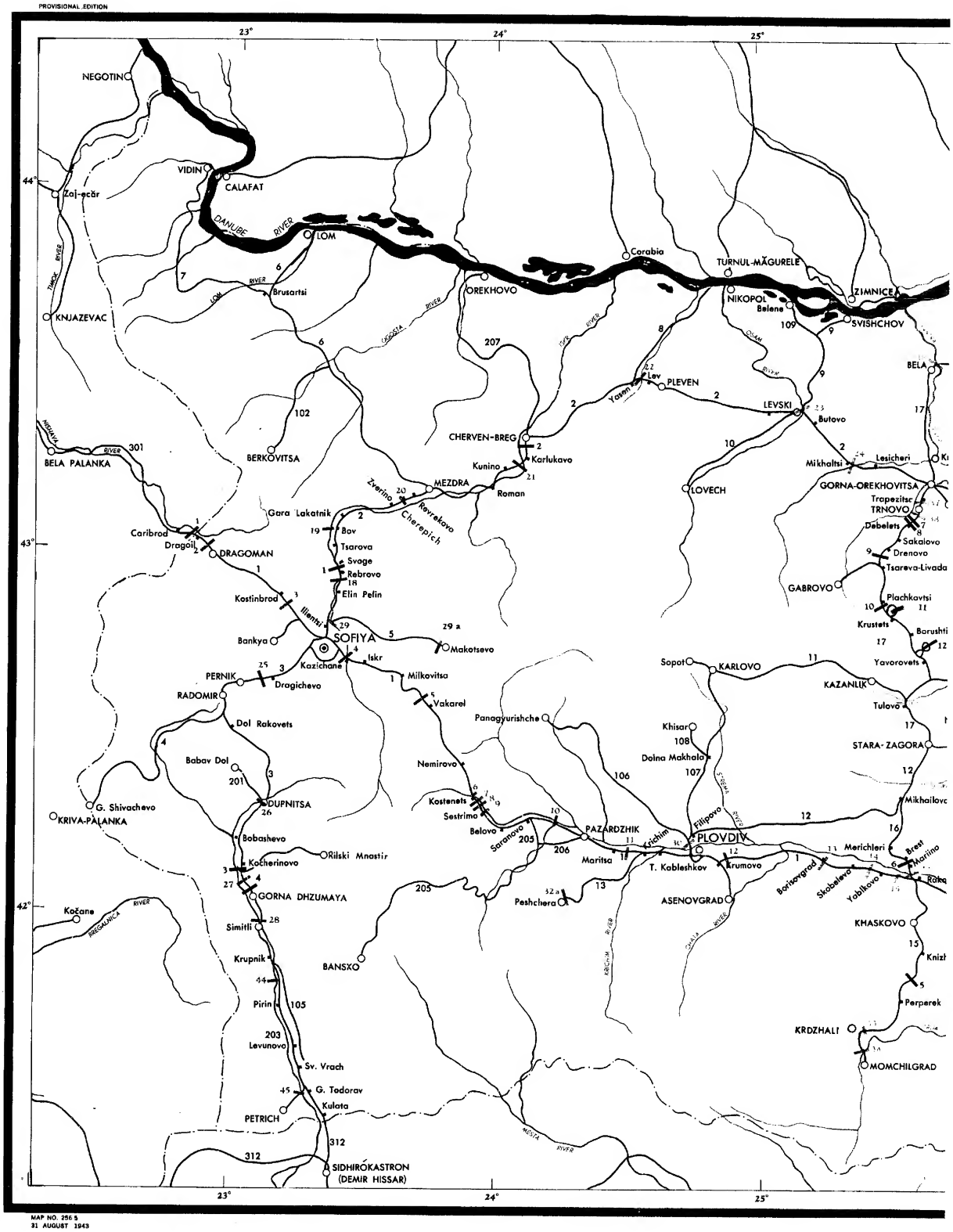
Reliability Code:

00-1B-2

0 10 20 30 40 50
MILES

0 10 20 30 40 50
KILOMETERS

COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS



Approved For Release 2000/08/29 : CIA-RDP79-01144A000100010010-9

tries. However, just as in the locomotive case, these cars are used on annexed lines and their acquisition has not improved the situation in Bulgaria proper. Even in peacetime there were frequent car shortages in autumn, the time of peak movement. The ratio between basic and peak requirements is still unfavorable and the general increase in freight traffic has accentuated the shortage. As a result, the other Axis countries have had to send freight cars to Bulgaria to obtain foodstuffs and other export goods. They have also had to use their own cars to transport their troops and supplies through Bulgaria. Consequently many foreign cars are always on Bulgarian lines.

(2) *Equipment production.* There are no plants for large-scale production of main line locomotives and cars in Bulgaria. The Koralovag Company in Varna has facilities for building small locomotives, but could hardly produce units larger than switching locomotives. In 1941, it also received an order for 200 cars, but had to buy the axles abroad.

(3) *Brakes.* No Bulgarian freight cars have airbrakes and only about 50 per cent have handbrakes (Table VII - 32). No airbrake system for freight cars has been introduced in Bulgaria. When sufficient foreign cars equipped with airbrakes are available to form whole trains or larger sections of trains, these can be operated with continuous brakes, since the locomotives have proper braking equipment. However, difficulties might arise, since Bulgarian crews do not have the necessary training to handle such operations.

Standard-gauge locomotives are equipped with handbrakes, and with various types of airbrakes such as Westinghouse, Hardy (vacuum) and Knorr (compressed air) (Table VII - 28). Narrow-gauge locomotives have handbrakes only (Table VII - 26).

Only about 50 per cent of the standard-gauge passenger cars are equipped with airbrakes. Almost all other standard-gauge, and all narrow-gauge passenger cars have handbrakes.

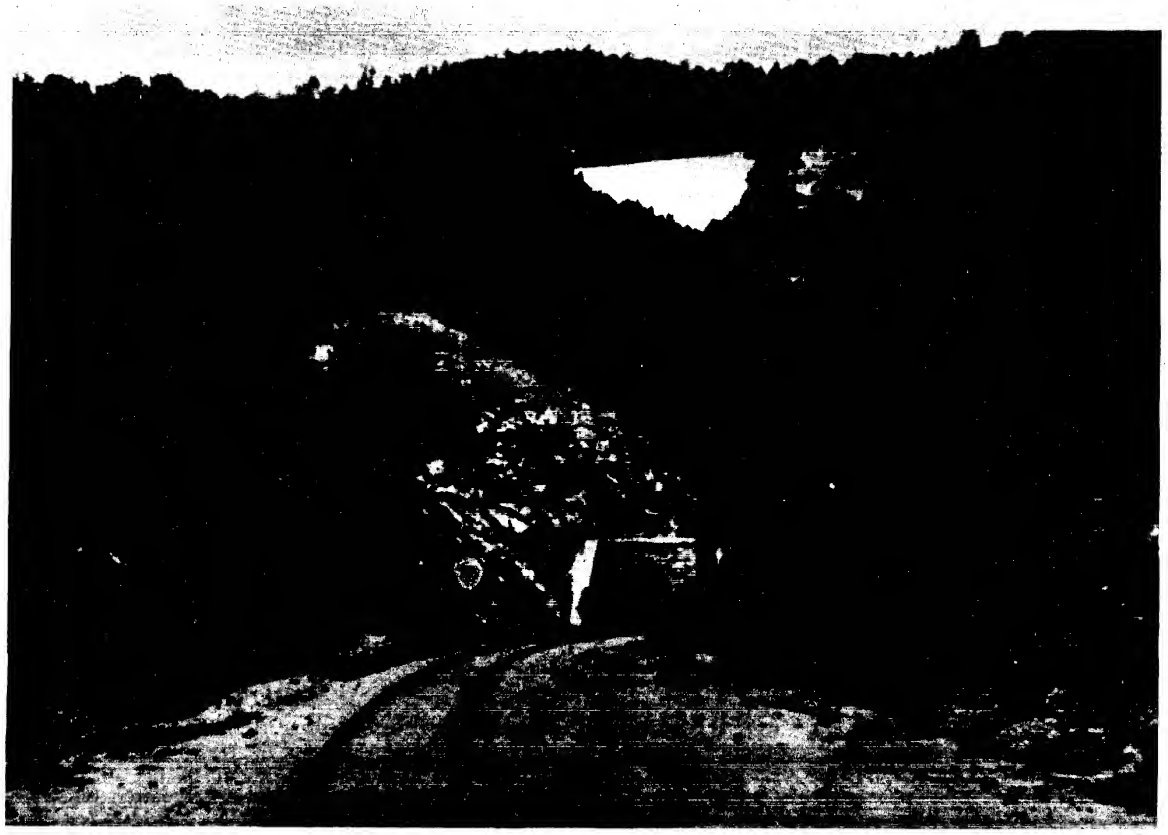


Illustration VII - 13. Tunnel near Krustets.
North entrance of tunnel, railway embankment above. 1917. (Tunnel 11, line 17.)

(4) *Couplings and buffers.* Standard continental types of screw coupling and buffers are used on all vehicles.

(5) *Maintenance of equipment.* Prior to the war, locomotives underwent major repairs every two years. But due to their age and the fact that a great part of them could not be housed in roundhouses, this did not keep them in a satisfactory state of repair. From 1939 to the end of 1941, heavy demands made it necessary to postpone all but vital repairs. To make up for this, train services were greatly curtailed during the spring of 1942 to facilitate overhauling of as many locomotives as possible. In spite of these efforts, the general state of repair of locomotives is poor.

A similar situation exists with respect to passenger and freight cars. Due to scarcity of lubricating oil hotboxes

doubtless are frequent and it is certain that the condition of passenger and freight cars is also unsatisfactory.

E. Shops, terminals and yards.

(1) ***Repair facilities.**** The main repair shop for locomotives and cars is in Sofiya. It can accommodate 15 to 20 locomotives at a time. A new workshop is reported under construction in Sofiya which, when completed, will be able to repair 20 to 30 locomotives per month. Other major workshops are in Plovdiv and Gorna Orekhovitsa. Two private plants, one at Drenovo and one at Varna, also repair cars of the national railroads. In addition, five running repair shops are available.

(2) ***Terminals.*** The only major passenger terminal is in Sofiya. It has recently been enlarged so that platform tracks for eight trains are available. All other stations are smaller.

(3) ***Switching yards.*** There is no modern classification yard in Bulgaria. Fairly large switching facilities are available in Sofiya, Plovdiv, Varna, Burgaz, and Pernik (for layout at Pernik, see Figure VII - 3). Smaller switching yards are located at the more important junctions and at a few intermediate points (Table VII - 35). Lack of adequate switching facilities offers particular difficulties for large-scale operation of troop and supply trains which do not move straight through the country.

F. Traffic.

(1) ***Passengers.*** The reported passenger traffic is shown in Table VII - 12.

TABLE VII - 12
BULGARIA, PASSENGER TRAFFIC

Year	Number of passengers (millions)	Per cent increase over 1938	Passenger miles (millions)	Passenger kilometers (millions)
1938.....	11.6	—	469	755
1939.....	12.8	10	502	808
1940.....	13.8	19	—	—
1941.....	14	21	—	—
1942.....	18	55	—	—

The figures for 1941 and 1942 include traffic in occupied areas and therefore are not comparable with statistics for the preceding years. However, since the areas taken over are not large, the large increase in passenger traffic in 1942 indicates an increase in Bulgaria proper.

In spite of pressing demands, passenger services have been somewhat restricted to make locomotives and crews available for vital freight traffic requirements.

(2) ***Freight.***

(*a*) *Volume.* The volume of freight traffic is shown in Table VII - 13.

TABLE VII - 13
BULGARIA, VOLUME OF FREIGHT TRAFFIC

	Metric tons	Short tons	Per cent increase over 1938 index figures
1938.....	6.2	6.8	100
1939.....	6.4	7.1	103
1940.....	7.2	7.9	116
1941.....	7.7	8.5	124
1942.....	7.8	8.6	126

As in the case of passenger traffic, the figures for 1941 and 1942 do not correspond with the statistics for 1940 and the pre-war years.

In 1940 an increase in traffic volume was caused by the growing demand for Bulgaria's products. It is obvious that subsequent to the German invasion of the Balkans, this increase has continued.

(*b*) *Commodities.* The commodities carried and their percentage of the total traffic are shown in Table VII - 14.

TABLE VII - 14
BULGARIA, COMMODITIES CARRIED AND PERCENTAGE OF TRAFFIC, 1939

	Per cent
Grain, fodder.....	10.9
Alcoholic beverages.....	4.8
Eggs.....	1.0
Lumber.....	6.4
Coal*.....	19.1
Stones, ceramics, gravel.....	7.1
Sand.....	0.3
Salt.....	1.3
Products of iron and steel industry.....	2.0
All others.....	47.1
	100.0

The war has only slightly changed this general picture. Coal shipments and export traffic in foodstuffs have increased more than the movement of other commodities. Through shipment of Rumanian oil, particularly to the south, has been greater than before the war. Traffic in industrial commodities is still of little importance, since major war industries have not been developed.

(*c*) *Traffic regulation.* The railroads have taken several measures to secure shipment of vital commodities and make the best possible use of cars. On December 1, 1942, average freight rates were increased by 30 per cent. In many places, including the ports, a system of priorities for ordering freight cars has been established. Demurrage charges have been increased and surcharges for inadequate loading of cars have been established. The distribution of privately-owned tank cars has been taken over by the railroad administration.

(3) ***Seasonal movements.*** The monthly ratios of passenger and freight traffic are given in Table VII - 15. Passenger traffic is considered on the basis of the number of passengers carried and freight traffic on the basis of the number of tons.

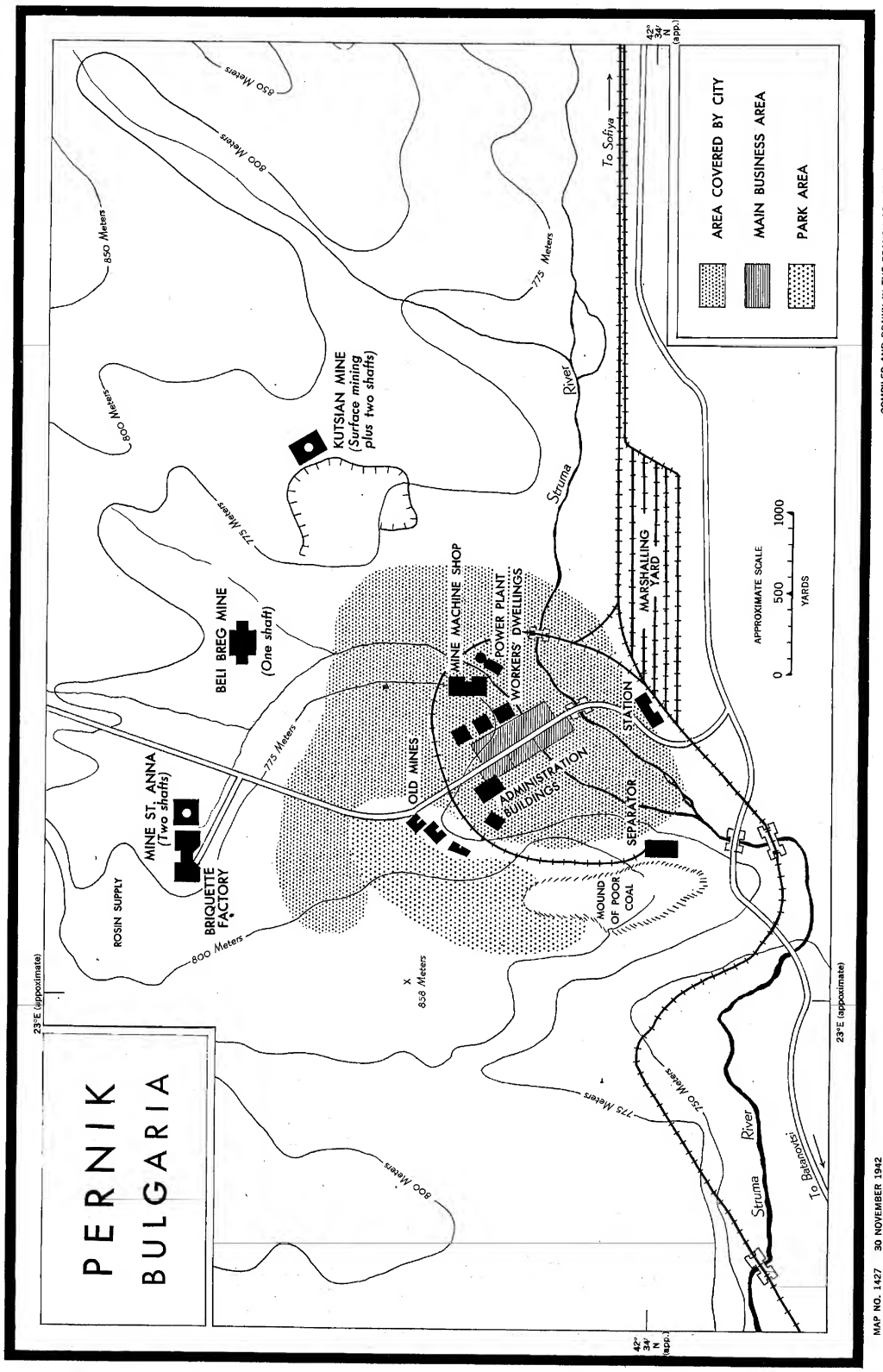
TABLE VII - 15
BULGARIA, MONTHLY RATIOS IN PERCENTAGE OF TOTAL ANNUAL TRAFFIC, 1940

	Passenger	Freight
January.....	7.0	4.4
February.....	5.8	5.4
March.....	6.5	6.5
April.....	7.7	7.9
May.....	9.3	8.1
June.....	7.9	7.9
July.....	8.6	8.7
August.....	10.5	9.2
September.....	9.1	10.5
October.....	9.3	11.2
November.....	9.2	10.9
December.....	9.1	9.3
	100.0	100.0

*For a list of repair facilities see Table VII - 33. For location, size and capacity of roundhouses see Table VII - 34.

*Mostly lignite from Pernik.

FIGURE VII - 3



These figures show that the passenger traffic peak usually was in the summer months. For freight traffic, the ratio between basic and peak load was extremely unfavorable. Traffic in October and November was more than twice as high as in January and February. Consequently, the use of freight cars was unevenly distributed. A surplus of cars in the early part of the year, and car shortages during the crop season, were inevitable.

The monthly ratios of passenger traffic have probably changed since the outbreak of war. The basic load of necessary business trips and of travel by soldiers on leave is now distributed more evenly throughout the year. On the other hand, seasonal tourist and recreational traffic has declined. Therefore, the curve of monthly ratios has flattened to some extent.

The freight traffic has changed much less. Although military movement is heavy throughout the year, the great bulk of agricultural commodities must still be carried during a comparatively short season.

G. Capacity.

(1) *Potentialities of the system.* Capacity of Bulgarian lines is low. The railroads are neither well built nor well maintained. Steep grades and sharp curves increase the difficulties of operation. Axle loads are generally low. The distances between stations and sidings are longer than in most European countries and the signal system is primitive. In addition, Bulgarian freight cars are not equipped with continuous air-brakes.

(2) *Normal capacity of the lines.* On most standard-gauge lines, not more than 12 trains per day can be operated. Only on a few lines can 16 trains per day be handled. Moreover, on some standard-gauge lines and on all narrow-gauge lines, only eight to ten trains can be operated per day. These estimates are based on the assumption that the system has suffered no damage from bombing, sabotage, or other activities; that all facilities function normally, and that the supply of locomotives and cars is sufficient to meet all demands. An estimate has been made of the number of trains which can be operated continuously over the important routes in the country and over the international connections, including the Ruse/Giurgiu ferry. (See Tables VII - 19 and VII - 36, and Figure VII - 4.) The character of the lines has been taken into consideration. After six days of continuous traffic, one day should be allowed for general maintenance and for adjusting the schedules of delayed shipments.

(3) *Capacity under extraordinary conditions.* No attempt has been made to estimate capacity of lines under extraordinary conditions, since all possible contingencies cannot be foreseen. Under actual military conditions it may not be possible to operate even the small number of trains given above. The limited switching facilities in junctions may constitute a severe handicap when traffic moves in other than the usual directions, or moves in several directions at the same time. The lack of experienced station and train crews and the reduction of regular train speeds, and especially the insufficient supply of standard-gauge equipment or of narrow-gauge equipment on individual lines, may seriously reduce capacities (see following sections).

(4) *Speed.* Since train speeds vary with the different characteristics of the lines and the changing operating conditions, no definite figures can be given for the speed of military trains. It can be assumed, however, that on the principal lines continuous military movements would not average more than 12 miles per hour, since train speeds in Bulgaria are generally very low.

(5) *Demand and supply of equipment.* The estimates given in Tables VII - 19 and VII - 36 are based on capacity of lines without considering availability of equipment. If full capacity even on principal lines is desired much additional equipment must be brought in. The following figures for equipment requirements under varying conditions have been estimated by computing locomotive and car miles for each particular case and by making adequate allowance for performance of locomotives and cars under varying conditions.

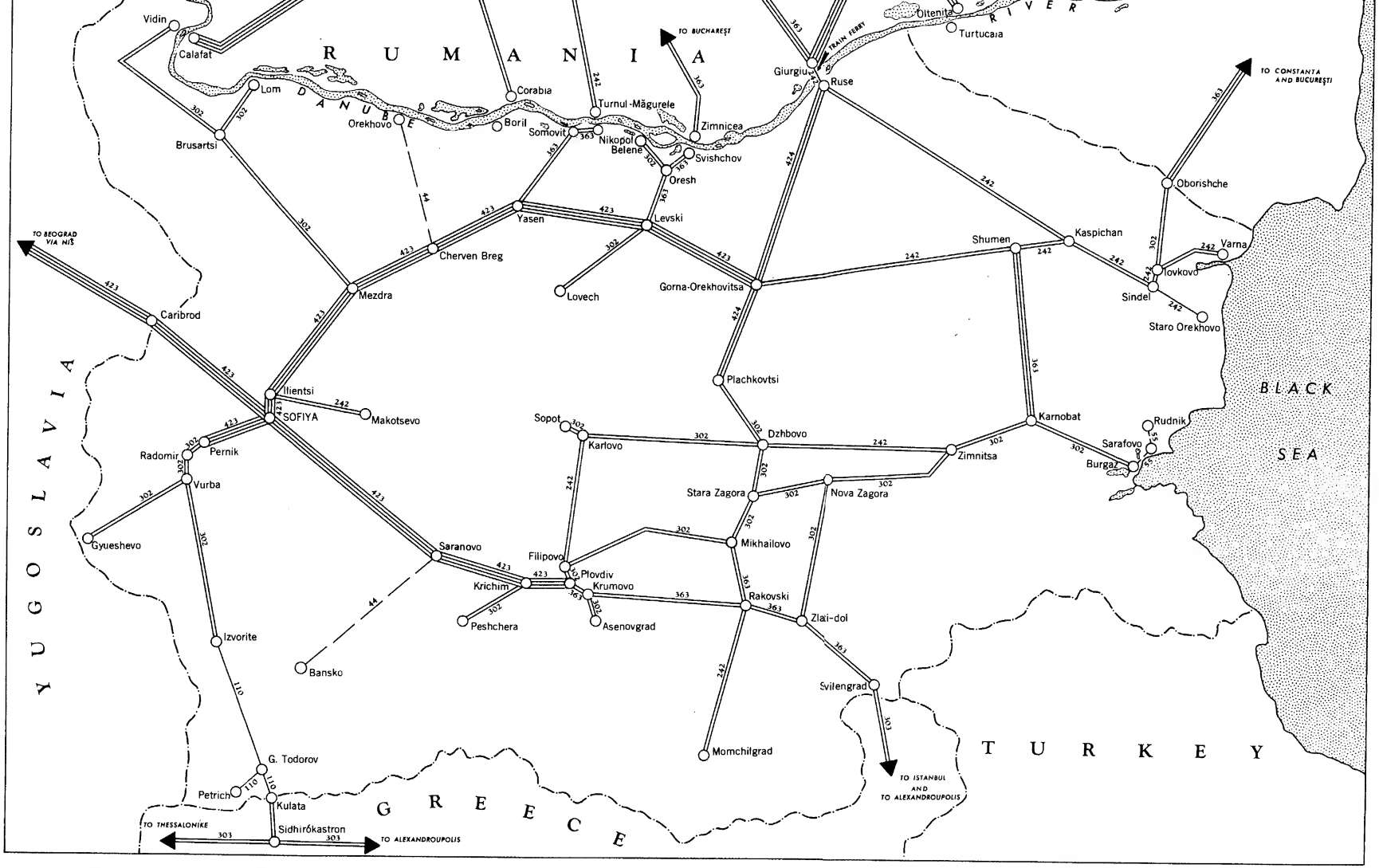
(*a*) For operating the lines 1, 2, 3, 4, 11, 12, 15, 16, 17, 19, 20, 203, 204 (shown in Figure VII - 2) to full capacity, 950 standard-gauge locomotives, 21,200 standard-gauge cars, 45 narrow-gauge locomotives, and 670 narrow-gauge cars would be needed.

(*b*) If on all other lines of the country, only a limited amount of traffic (one train daily in each direction) were operated, an additional 50 standard-gauge locomotives, 1,100 standard-gauge cars, 25 narrow-gauge locomotives, and 160 narrow-gauge cars would be needed.

(*c*) For operating all lines listed in Table VII - 36 to full capacity, 1,400 standard-gauge locomotives, 33,000 standard-gauge cars, 140 narrow-gauge locomotives, and 1,500 narrow-gauge cars would be needed.

It is assumed that these locomotives are sufficiently efficient to handle the amount of tonnage required. If helper locomotives were required, the total number of locomotives would have to be increased. All car requirements are given in terms of freight cars, although passenger cars could be used in their place for the transport of troops. If additional equipment is brought in additional sidings, yards and maintenance facilities will also be required.

(6) *Weight of trains and trainloads.* The weight of trains is limited by such factors as grades, curves, and the maximum permissible axle loads of the lines. In 1938, average gross weight of freight trains on standard-gauge lines was 454 metric tons (500 short tons). About 30 per cent of the car miles represented empty cars. Average tare weight of standard-gauge freight cars was nine metric tons (9.9 short tons) and loading capacity, 16 metric tons (17.6 short tons) (Table VII - 17). In general, however, loading capacity cannot be fully utilized owing to the bulky nature of military equipment, and the consequently unfavorable ratio between space and weight. Taking these factors into consideration, it is estimated that net loads of freight trains on a few standard-gauge lines are between 300 and 400 metric tons (330 and 440 short tons), but on all other lines under 300 metric tons (330 short tons). Net loads on narrow-gauge lines are much lower. Tables VII - 19 and VII - 36, as well as Figure VII - 4 give estimates of the gross weight (trailing weight, not including locomotives and tenders) and net load per train, as well as of the average daily net loads in each direction on all important lines and on the international connections under regular operating conditions. These figures apply to the main direction of traffic movement and empty car movements are not considered.



BULGARIA: CAPACITIES OF SELECTED RAILROADS

(UNDER NORMAL OPERATING CONDITIONS)

SCHEMATIC MAP

AVERAGE DAILY CAPACITIES OF SELECTED LINES IN EACH DIRECTION

302 AVERAGE NET LOAD (SHORT TONS) PER TRAIN SHOWN IN BLACK

NUMBER OF TRAINS PER DAY IN EACH DIRECTION SHOWN IN RED

Under 500	500-2500	2501-5000	5001-6000	6001-7750

Reliability Code: 2B-- 2B-- 2

MAP NO. 2566
15 SEPTEMBER 1943

COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

Approved For Release 2000/08/29 : CIA-RDP79-01144A000100010010-9

H. Vulnerable points.

Owing to the nature of the terrain, the network of the Bulgarian railroads is highly vulnerable. There are a great many bridges and tunnels which can easily be destroyed from the air, by sabotage, or by ground forces. Many bridges are located in gorges and narrow valleys where repairs are difficult. In many places, bridges and tunnels follow each other, as near Gorna Dzhumaya (line 202), where there is a bridge with a tunnel on each end, and on the Ruse/Stara-Zagora section (line 17) where there is a series of bridges and tunnels in the difficult terrain of the Stara-Planina. (The more important bridges and tunnels are listed in Tables VII - 37 and VII - 38 and are shown on Figure VII - 2.)

Major junctions are Sofiya (lines 1, 2, 3, 5, 104); Gorna Orekhovitsa (lines 2, 17); Plovdiv (lines 1, 12, 14, 106, 107); Stara-Zagora (lines 12, 17), and Dubovo (lines 11, 17). Ruse (lines 17, 19, 112, 306), with its rail ferry, is the important border terminus for Rumanian traffic. None of these stations covers a large area and therefore could be destroyed by a limited number of bombs. Their destruction would seriously interrupt the flow of traffic. Larger switching facilities are in Sofiya, in Pernik (line 3) (coal traffic), as well as in Plovdiv, Varna and Burgaz (port traffic). The only large repair shop is in Sofiya. Other repair shops and almost all roundhouses are of small capacity. (Workshops, roundhouses, and switching yards are described in Tables VII - 33, VII - 34, and VII - 35. These facilities and the railroad stations are shown on Plan VII - 1.)

I. Lines under construction.*

(1) Batanovtsi/Kostinbrod 59 kilometers (37 miles), Line 401. This line will be a loop between the Orient Express (line 1) on one hand and the Struma Valley (line 4) and the future line to Skoplje, Yugoslavia, which is now under construction (412). No information is available as to the progress of work. However, it is certain that the line is not yet in operation.

(2) Gorna Dzhumaya/Frontier/Kočane, Yugoslavia, 16 kilometers (10 miles), Line 402. This line will link the Struma Valley line with the Veles/Kočane branch of the Skoplje/Thessaloníki, Greece, route. Work began late in 1941 and is still in progress, but will not proceed with much speed before the standard-gauge line through the Struma Valley is completed.

(3) Bansko/Simitli 39 kilometers (24 miles), Line 403. This line will connect the Struma Valley line with the recently completed Belovo/Bansko line, a branch of line 1. No information of the progress of work is available. It is doubtful whether it is being pushed.

(4) Bansko/Nevrokop 56 kilometers (35 miles), Line 404. After the Belovo/Bansko line was recently completed, work began on this line and still is in progress.

(5) Simitli/Frontier/Sidhirókastron, Greece, 61 kilometers (38 miles), Line 405. This standard-gauge line, which will replace the existing narrow-gauge line, is of particular strategic importance as a connection to Thessaloníki. The German Todt organization takes actual part in the work and forced labor is being employed. Standard-gauge operation ends at Simitli or Krupnik and will probably be extended to Sv. Vrach in October 1943. Completion of the line is scheduled for 1944.

(6) Makotsevo/Sopot 100 kilometers (62 miles), Line 406. This line is the still-uncompleted link between the existing sections of the Sub-Balkan line (5, 11). Work had begun in 1941. It is not certain whether it is continuing at present.

(7) Momchilgrad/Zlatograd/Polianthos, Greece, 47 kilometers (29 miles), Line 407. This line will be a continuation of the north-south route of Ruse/Momchilgrad into former Greek territory, and will provide a connection to the Aegean Sea points. Work started at the end of 1941. In July 1942, the old frontier at Zlatograd had not been reached. No information is available about the present situation.

(8) Lovech/Troyan/Kurnare 59 kilometers (37 miles), Line 408. This line is a new north-south connection between the Levski/Lovech and the Sub-Balkan lines. No information about the progress of work is available.

(9) Leskovets/Elena 32 kilometers (20 miles), Line 409. The progress of work on this branch of the Sofiya/Kaspichan (line 2) is not known.

(10) Popovo/Razgrad/Isperikh/Silistra, Rumania, 126 kilometers (78 miles), Line 410. A new line is under construction into the Dobrogea area with possible continuation to Silistra on the Danube. No information about the progress of work is available.

(11) Preslav/Vrbitsa 27 kilometers (17 miles), Line 411. No information is available on the progress of work on this branch of the Sofiya/Kaspichan line.

(12) Murna/Sindel 35 kilometers (22 miles), Line 412. This line will be an important connection between Varna and Burgaz and between Ruse and Burgaz.

(13) Gyueshevo/Frontier/Kumanovo, Yugoslavia two kilometers (one mile), Line 413. This will be a new connection (short section in Bulgaria proper) between Sofiya and Skoplje, Yugoslavia, on the Niš/Thessaloníki line. Work was begun in February 1942. Some portion of the line is completed. It is expected to be open within two years.

(14) Sofiya/Pernik 33 kilometers (21 miles), Line 414. A new connection between Sofiya and the mining town of Pernik.

J. Projected lines.

As far as information is available, no work has begun on any of the following projected railroad lines.

(1) Bankya/Pernik 20 kilometers (12 miles), Line 501. A connection between the mining town of Pernik and the summer resort of Bankya is planned.

(2) Batanovtsi/Breznik/Trn 60 kilometers (37 miles), Line 502. This line will serve as a branch of line 401.

(3) Vidin/Kula 35 kilometers (23 miles), Line 503. A connection of Kula to the Danube at Vidin is planned.

(4) Petrich/Frontier/Udovo, Yugoslavia, 23 kilometers (14 miles), Line 504. A new connection from the Struma into the Vardar Valley in former Yugoslav territory is projected.

(Continued on page VII - 40)

*See Plan VII - 1.

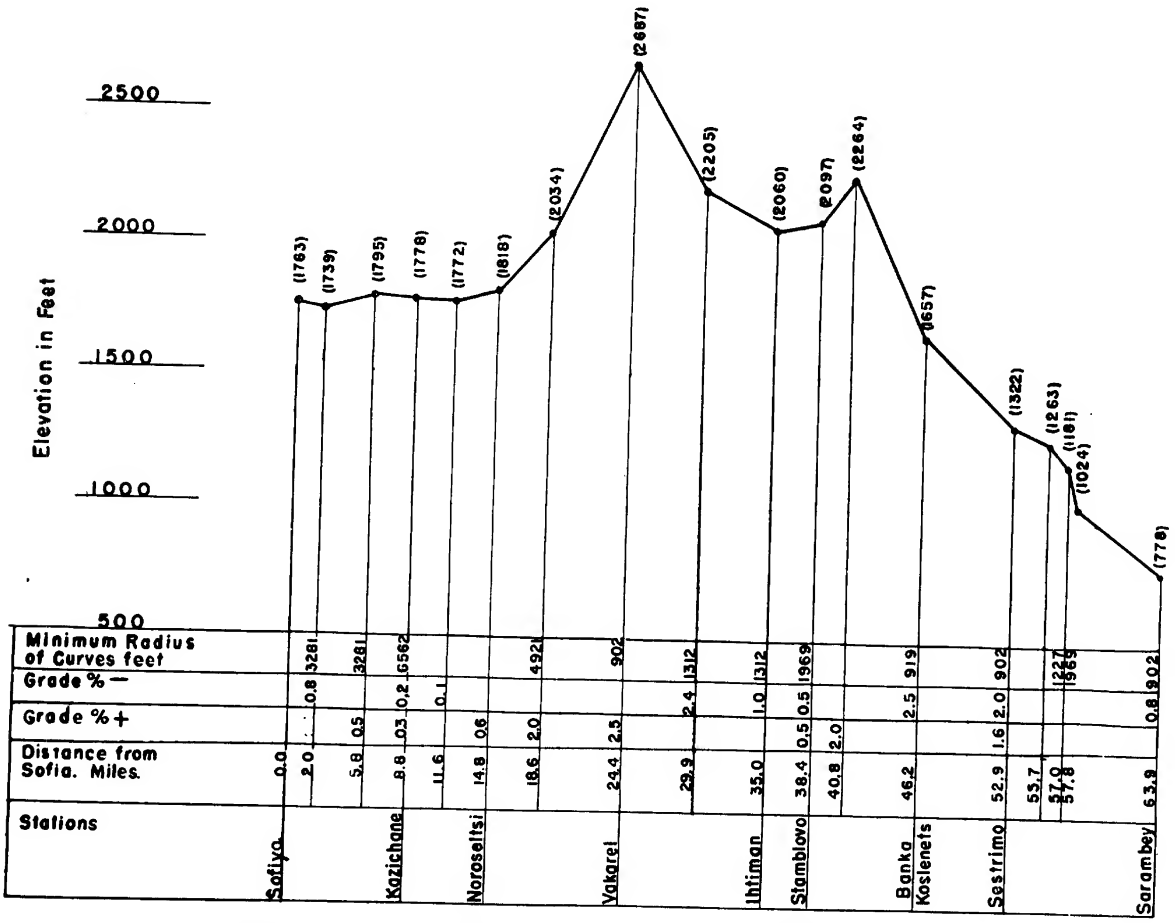


Illustration VII - 14. Profile Sofiya—Saranovo Section on Caribrod/Svilengrad Line.

Illustration VII - 15. Pernik.
Railroad yard on the Sofiya/Radomir/Simitli route. (Line 3.)

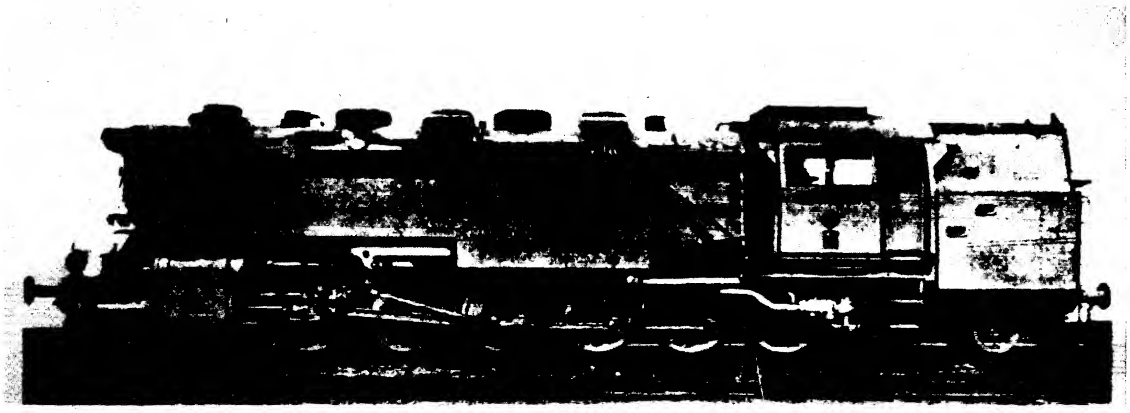


Illustration VII - 16 (a). Bulgarian National Railroads.
2–12–4 Standard-gauge Tank Locomotive. (Table VII - 28.)

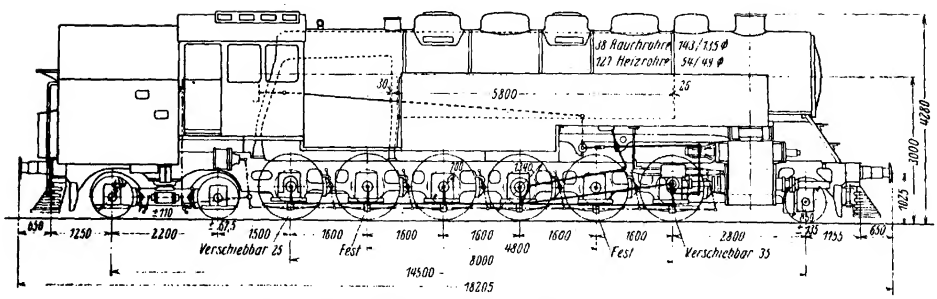


Illustration VII - 16 (b). Bulgarian National Railroads.
Drawing of 2–12–4 Standard-gauge Tank Locomotive. Dimensions are in millimeters (one millimeter=0.328 foot).

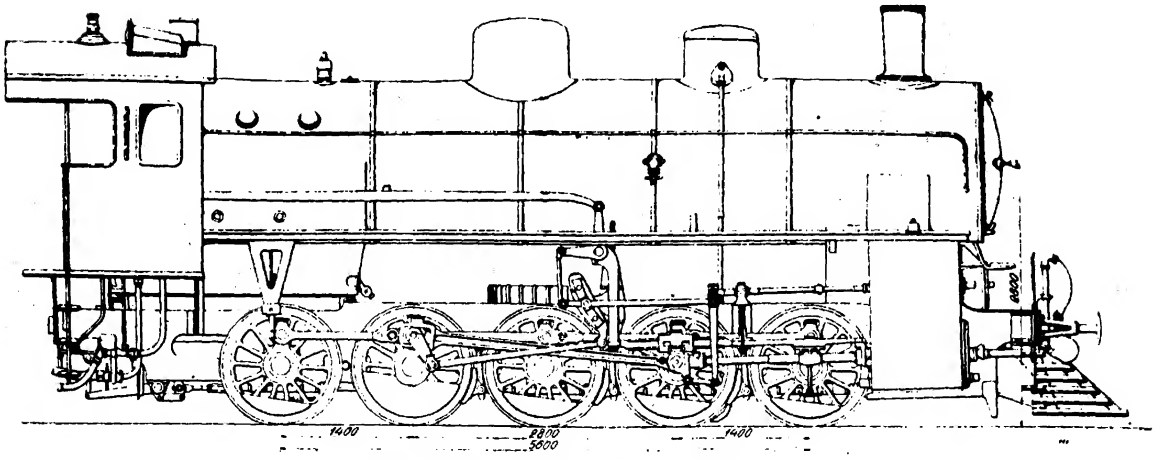


Illustration VII - 17. Bulgarian National Railroads.
Drawing of 0–10–0 Standard-gauge Locomotive. (Table VII - 28.) Dimensions are in millimeters (one millimeter=0.328 foot).

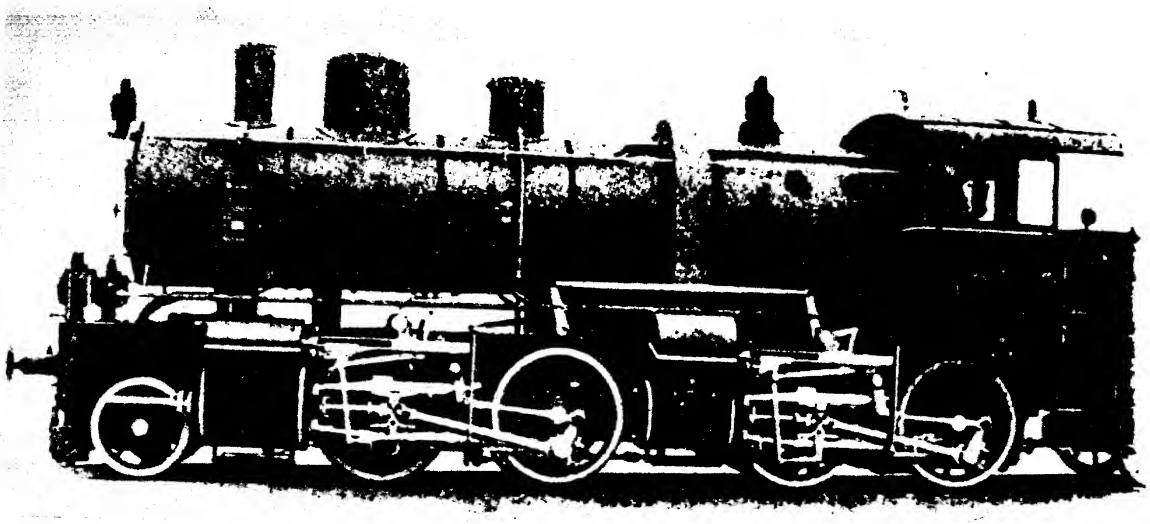


Illustration VII - 18 (a). Bulgarian National Railroads.
2–4 + 4–0 Standard-gauge Locomotive. (Table VII - 28.)

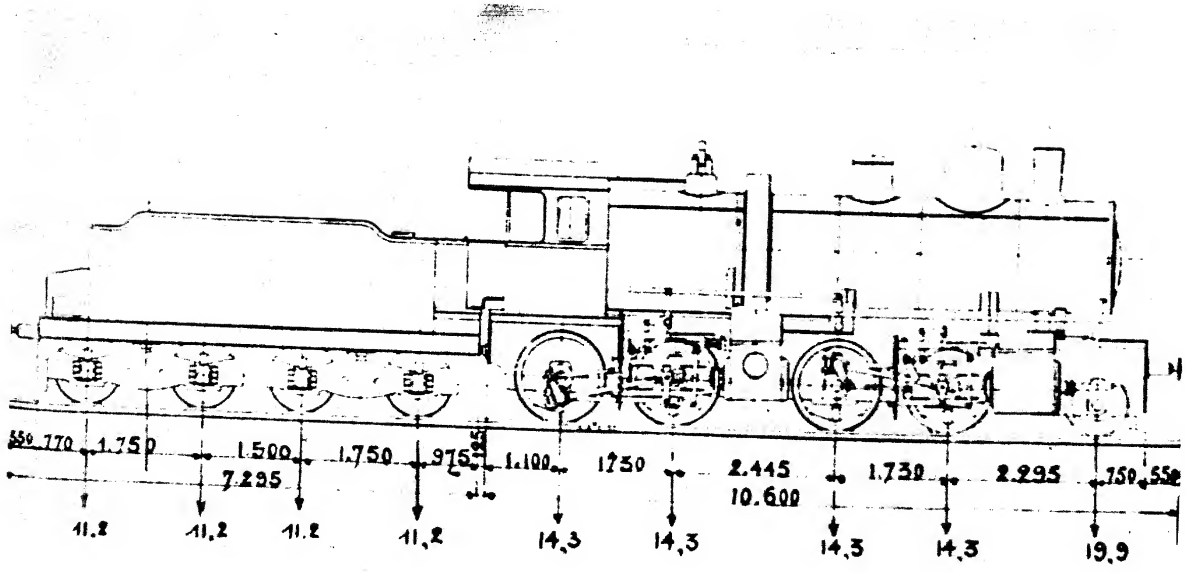


Illustration VII - 18 (b). Bulgarian National Railroads.
Drawing of a 2–4 + 4–0 Standard-gauge Locomotive. Figures pointing to axles are metric tons.
Dimensions are in meters (one meter = 3.28 feet).

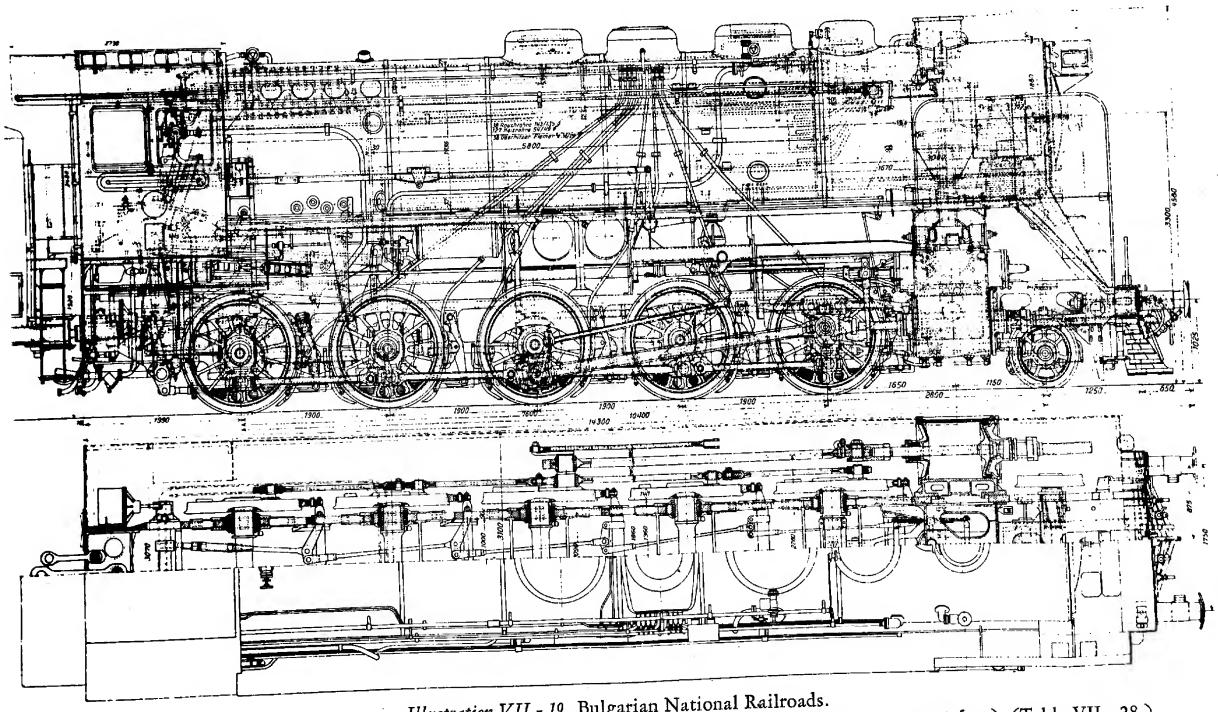


Illustration VII - 19. Bulgarian National Railroads.
Drawing of 2–10–0 Standard-gauge Locomotive. Dimensions are in millimeters (one millimeter = 0.328 foot). (Table VII - 28.)

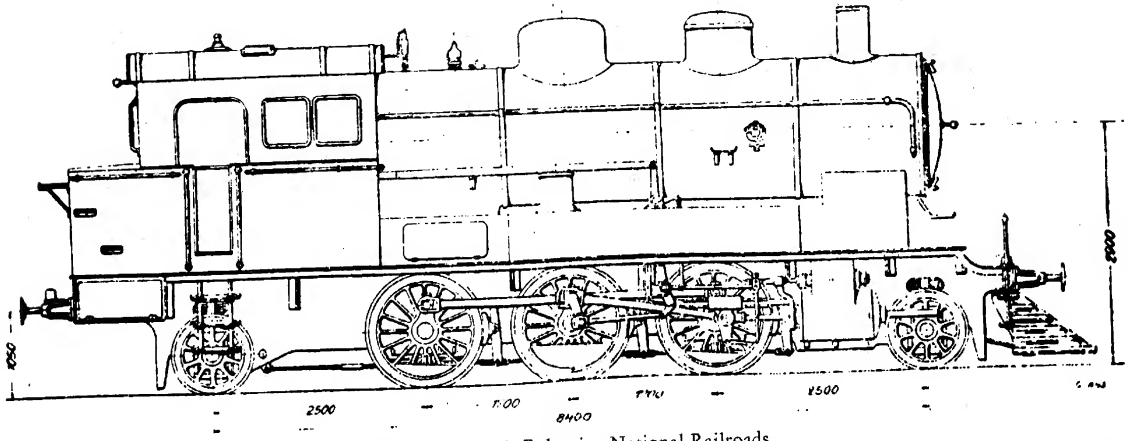


Illustration VII - 20. Bulgarian National Railroads.
Drawing of 2–6–2 Standard-gauge Tank Locomotive. Dimensions are in millimeters (one millimeter = 0.328 foot). (Table VII - 28.)

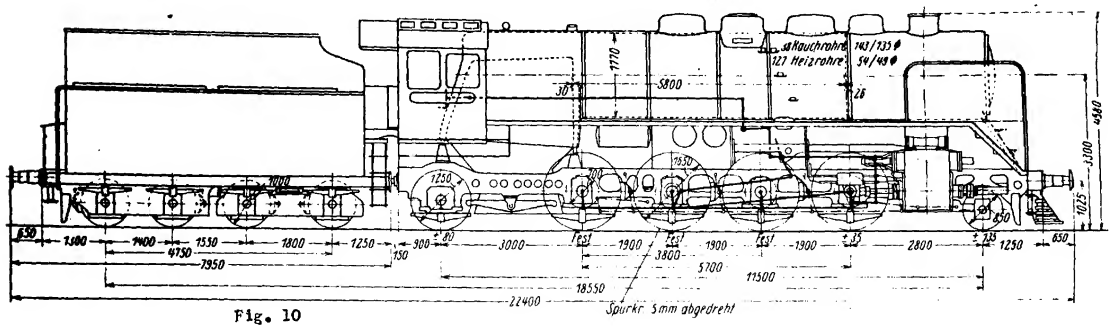


Illustration VII - 21. Bulgarian National Railroads.
2-8-2 Standard-gauge Locomotive. Dimensions are in millimeters (one millimeter 0.328 foot). (Table VII - 28.)

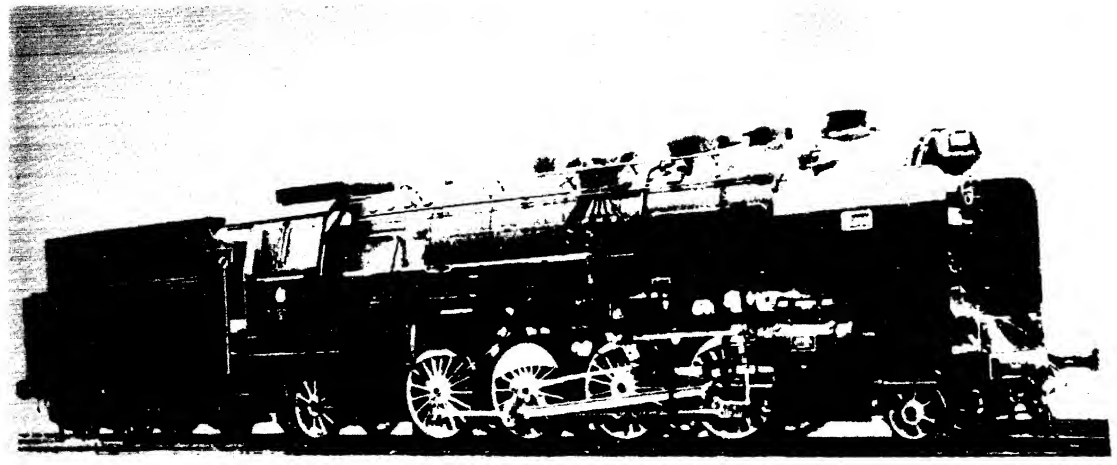


Illustration VII - 22. Bulgarian National Railroads.
2-8-2 Standard-gauge, Express Locomotive.

TABLE VII - 16
BULGARIA, PRINCIPAL RAILROAD LINES (STANDARD GAUGE) AND THEIR CHARACTERISTICS*

Line No.	Lines	Length of Line Km.	Length of Line Miles	Maximum Axle Load (Met. Tons)	Maximum Grade (Per Cent)	Maximum Curvature (Degrees)	Maximum Distance Between Stations Km.	Maximum Distance Between Stations Miles	Principal Connections with the Following Lines
1.	Caribrod, Yugoslavia/Svilengrad.... (Profile of Sofiya/Saranovo Section Illus. VII - 14)	364	226	17 (a) 14 (b)	2.5 (c) 1.5 (d)	6° 4′	13	8	At Voluyak, line 103; at Sofiya, lines 2, 3, and 104; at Saranovo, line 204; at Pazardzhik, line 205; at Krichim, line 13; at Plovdiv lines 12, 14, 106, and 107; at Rakovski, lines 15 and 16; at Zlati-dol, line 113.
2.	Sofiya/Kaspichan (Kaspichan/Varna on line 19).....	459 (e)	285 (e)	17 (f) 14 (g)	2.5	8° 7′	13	8	At Sofiya, lines 1, 3, and 104; at Mezdra, line 6; at Cherven-Breg, line 206; at Yasen, line 8; at Levski, line 9; at Gorna Orekhovitsa, lines 17 and 111; at Tsar Krum, line 115; at Shumen, line 18; at Kaspichan, lines 19 and 207.
3.	Sofiya/Radomir/Simitli.....	143 (h)	89 (h)	17 (i) 14 (j)	2.0	5° 8′	8	5	At Sofiya, lines 1, 2, and 104; at Pernik, line 105; at Vrba, line 4; at Dupnitsa, line 201; at Kocherinovo, line 202.
4.	(Sofiya/Vrba on line 3) Vrba/ Gyueshevo.....	84	52	14	2.5	8° 7′	10	6	At Vrba, line 3.
5.	Ilientsi/Makotsevo (k).....	46	29	14	1.5	7° 0′	19	12	At Ilientsi, line 2.
6.	Mezdra/Lom.....	119	74	14	2.2	8° 7′	11	7	At Mezdra, line 2; at Boichinovtsi, line 102; at Brusartsi, line 7.
7.	Brusartsi/Vidin.....	87	54	14	2.5	6° 4′	10	6	At Brusartsi, line 6; at Vidin, line 101.
8.	Yasen/Somovit/Nikopol.....	47	29	14	1.5	7° 0′	6	4	At Yasen, line 2.
9.	Levski/Svishtov.....	48	30	14	1.5	5° 8′	12	8	At Levski, lines 2 and 10; at Oresh, line 109.
10.	Levski/Lovech.....	47	29	14	1.5	7° 0′	16	10	At Levski, lines 2 and 9.
11.	Zimnitsa/Dubovo/Sopot (l).....	177	110	14	1.6	7° 0′ (m) 3° 5′ (n)	11	7	At Zimnitsa, line 12; at Dubovo, line 17; at Karlovo, line 107.
12.	Plovdiv/Burgaz.....	293	182	14	1.2	6° 5′	15	9	At Plovdiv, lines 1, 14, 106, and 107; at Mikhailovo, line 16; at Stara Zagora, line 17; at Nova Zagora, line 113; at Yambol, line 114; at Zimnitsa, line 11; at Karnobat, line 18; at Burgaz, lines 118 and 209.
13.	Krichim/Peshtera (o).....	28	17	14	2.6	4° 4′	12	8	At Krichim, line 1.
14.	Krumovo/Asenovgrad (p).....	10	6	14	1.3	4° 4′	10	6	At Krumovo, line 1.
15.	Rakovski/Momchilgrad.....	100	62	14	2.5	7° 0′	14	9	At Rakovski, lines 1 and 16.
16.	Mikhailovo/Rakovski.....	31	19	14	1.5	5° 8′	10	6	At Mikhailovo, line 12; at Rakovski, lines 1 and 15.
17.	Ruse/Stara Zagora (l).....	258	160	14 (q) 17 (r)	2.5	7° 8′	15	9	At Ruse, lines 19 and 112; at Gorna Orekhovitsa, lines 2 and 111; at Tsareva Livada, line 110; at Dubovo, line 11; at Stara Zagora, line 12.
18.	Shumen/Karnobat.....	133	83	14	1.2	4° 4′	10	6	At Shumen, line 2; at Karnobat, line 12.
19.	Ruse/Varna.....	225	140	14	2.4	9° 1′	22	14	At Ruse, lines 17 and 112; at Kaspichan, lines 2 and 207; at Sindel, line 117; at Iovkovo, line 20; at Varna, line 116.
20.	Iovkovo/Oborishte.....	52	32	14	(s)	(s)	14	9	At Iovkovo, line 19.
	Total.....	2,751	1,708						

(a) Caribrod/Sofiya/Plovdiv.
(b) Plovdiv/Svilengrad.
(c) Dragoman/Belovo.
(d) Belovo/Svilengrad.
(e) Double track, Voluyak/Iskr (short distance beyond station)—20 kms. (12 mi.).
(f) Sofiya/Gorna Orekhovitsa.
(g) Gorna Orekhovitsa/Kaspichan.
(h) Double track, Pernik to Vladaya—14 kms. (9 miles).
(i) Sofiya/Pernik.
(j) Pernik/Simitli (Izvorite).
(k) Makotsevo/Sopot section under construction.
(l) Section, Dubovo/Tulovo—8 kms. (5 miles), forms part of lines 11 and 17. Length of this section included only in line 17.
(m) Zimnitsa/Dubovo.
(n) Kazanlk/Karlovo.
(o) Section to Barak under construction.
(p) Projected to continue line to Ustovo.
(q) Ruse/Plachkovtsi.
(r) Plachkovtsi/Stara Zagora.
(s) No information.

*See Plan VII - 1.

TABLE VII - 17
BULGARIA, OTHER LINES (STANDARD GAUGE) AND THEIR CHARACTERISTICS*

Line No.	Lines	Length of line Km.	Length of line Miles	Maximum Axle Load (Met. Tons)	Maximum Distance Between Stations Km.	Maximum Distance Between Stations Miles	Principal Connections with the Following Lines
101	Vidin/Vidin Port	1.5	1	14	(a)	(a)	At Vidin, line 7.
102	Boichinovtsi/Berkovitsa	36	22	14	14	9	At Boichinovtsi, line 6.
103	Voluyak/Bankya	11	7	14	(a)	(a)	At Voluyak, line 1.
104	Sofiya Loop Line	24	15	14	(a)	(a)	At Sofiya, lines 1, 2, and 3.
105	Pernik Branch Line	1.5	1	14	(a)	(a)	At Pernik, line 3.
106	(Plovdiv/Filipovo on line 12) Filipovo/Panagyurishte	71	44	14	22	14	At Filipovo, lines 12 and 107.
107	(Plovdiv/Filipovo on line 12) Filipovo/Karlovo	60	37	14	18	11	At Plovdiv, line 1; at Filipovo, lines 12 and 106; at Dolna Makhala, line 108.
108	Dolna Makhala/Khisar	11	7	14	(a)	(a)	At Dolna Makhala, line 107.
109	Oresh/Belene	13	8	14	(a)	(a)	At Oresh, line 9.
110	Tsareva-Livada/Gabrovo	17	11	14	(a)	(a)	At Tsareva-Livada, line 17.
111	Gorna Orekhovitsa/Leskovets	6	4	14	(a)	(a)	At Gorna Orekhovitsa, lines 17 and 2.
112	Ruse Loop Line (b)	5	3	14	(a)	(a)	At Ruse, lines 17 and 19.
113	Zlati-dol/Nova Zagora	62	39	14	23	14	At Zlati-dol, line 1; at Nova Zagora, line 12.
114	Yambol/Elkhovo	43	27	14	12	8	At Yambol, line 12.
115	Tsar Krum/Preslav	7	4	14	7	4	At Tsar Krum, line 2.
116	Sindel/Staro Orekhovo	28	17	14	(a)	(a)	At Sindel, line 19.
117	Burgaz/Pomoriye	25	16	14	(a)	(a)	At Burgaz, lines 12 and 209; at Sarafovo, line 209.
	Total	422	263				
	Total Standard Gauge	3,173	1,971				

(a) No information.
(b) Section of loop not included in lines 17 and 19; all of which forms a loop line around Ruse.

*See Plan VII - 1.

TABLE VII - 18
BULGARIA, NARROW-GAUGE LINES AND THEIR CHARACTERISTICS*

Line No.	Lines	Length of Line Km.	Length of Line Miles	Maximum Axle Load (Met. Tons)	Maximum Grade (Per Cent)	Maximum Curvature (Degrees)	Maximum Distance Between Stations Km.	Maximum Distance Between Stations Miles	Principal Connections with the Following Lines
201	Dupnitsa/Bobov-dol (a)	13 (b)	8 (b)	(c)	(c)	(c)	(c)	(c)	At Dupnitsa, line 3.
202	Kocherinovo/Rilski Mnastir (d)	41 (b)	26 (b)	(c)	(c)	(c)	(c)	(c)	At Kocherinovo, line 3.
203	Simitli/Petrich (e)	70 (b)	44 (b)	14	2	2° 5′	12	8	At General Todorov, line 204.
204	General Todorov/Kulata (f)	14 (b)	9 (b)	(c)	(c)	(c)	(c)	(c)	At General Todorov, line 203.
205	Saranovo/Chepino/Iztok/Bansko (g)	115 (b)	72 (b)	14	3.0 (i)	34° 9′ (j)	15	9	At Saranovo, line 1; at Varvara, line 206.
206	Pazardzhik/Varvara	17 (b)	11 (b)	9.5	1.5	23° 3′	(c)	(c)	At Pazardzhik, line 1; at Varvara, line 205.
207	Cherven-Breg/Orekhovo	104 (b)	65 (b)	14	2.0	21° 8′ (k)	11	7	At Cherven-Breg, line 2.
208	Kaspichan/Tod. Ikonomovo (Krania)	57 (b)	35 (b)	(c)	(c)	(c)	11	7	At Kaspichan, lines 2 and 19; at Ruzhitsa, line 209.
209	Ruzhitsa/Bozhidar	8 (b)	5 (b)	(c)	(c)	(c)	9	6	At Ruzhitsa, line 208.
210	Burgaz/Sarafovo/Rudnik	24 (b)	15 (b)	(c)	(c)	(c)	(c)	(c)	At Burgaz, lines 12 and 118; at Sarafovo, line 118.
	Total Narrow Gauge	463	290						
	Grand Total	3,636	2,261						

(a) Line is being converted to standard gauge.
(b) Gauge 60 cm. (1 ft. 11½ in.)
(c) No information.
(d) From Pastra/Rilski Mnastir, privately-owned line, operated by the government.
(e) Narrow-gauge continuation of standard-gauge Sofiya/Simitli line. At present, it is being converted to standard gauge.
(f) At present, it is being converted to standard gauge.
(g) Line in course of construction beyond Bansko. No details available.
(h) Gauge 76 cm. (2 ft. 6 in.)
(i) Saranovo/Chepino. No details available for rest of line, but maximum almost certainly 3.0 per cent.
(j) Saranovo/Chepino. No details available for rest of line.
(k) Cherven-Breg/Bela Slatina.
(l) Bela Slatina/Orekhovo.

*See Plan VII - 1.

TABLE VII - 19

BULGARIA, INTERNATIONAL CONNECTIONS WITH BULGARIA AND THEIR CAPACITIES*

Border Station	Line	Connection	Number of Trains per Day in Each Direction	Average Gross Weight per Train (a) Metric Tons	Average Gross Weight per Train (a) Short Tons	Net Load per Train Metric Tons	Net Load per Train Short Tons	Average Daily Net Load in Each Direction Metric Tons	Average Daily Net Load in Each Direction Short Tons
A. Yugoslavia									
1. Caribrod	301	Niš/Beograd	16	770	847	385	424	6160	6776
B. Rumania									
1. Vidin (b)	302	Calafat/Craiova (/Bucureşti)	16	880	968	440	484	7040	7744
2. Boril or Gigen (c)	303	Corabia (/Bucureşti)/Piatra Olt	12	440	484	220	242	2640	2904
3. Nikopol (b)	304	Turnul Magurele/Roşiorii de Vede (/Bucureşti)	12	440	484	220	242	2640	2904
4. Svishtov (b)	305	Zimnicea/Roşiorii de Vede (/Bucureşti)	12	660	726	330	363	3960	4356
5. Ruse	306	Train Ferry; Ruse/Giurgiu	10	440	484	220	242	2200	2420
	307	Giurgiu/Videle (/Bucureşti)	16	660	726	330	363	5280	5808
	308	Giurgiu/Bucureşti (/Ploeşti)	16	880	968	440	484	7040	7744
6. Turtucaia (c)	309	Oltenita/Mogoşoaia/Bucureşti	16	660	726	330	363	5280	5808
7. Oborishte	310	Botevo/Dobrich/Medgidia (/Constanţa and Bucureşti)	16	660	726	330	363	5280	5808
C. Greece									
1. Svilengrad	311	Ormenion/Pithion/Alexandroúpolis/ Istanbul	10	550	605	275	303	2750	3025
2. Kulata	312	Sidhirókastron/Alexandroúpolis (Borisgrad) and Thessaloníki	10	550	605	275	303	2750	3025

(a) Trailing weight (not including locomotives and tenders).
(b) No through connection across the Danube.
(c) No railroad connection in Bulgaria and across the Danube.

*See Figure VII - 4.

TABLE VII - 20

BULGARIA, COMPARISON OF RAILROAD DENSITY TO OTHER COUNTRIES

Country	Area Sq. Mi.	Population	Population per Sq. Mi.	Railroad Mileage Miles	Railroad Mileage per 100 Sq. Mi.	Railroad Mileage per 10,000 Population
Bulgaria	39,825	6,385,000	160	2,261	5.7	3.5
			(For Comparison)			
Rumania	113,884	19,933,000	175	7,068	6.2	3.6
Yugoslavia	95,849	15,400,000	161	6,468	6.8	4.2
Italy	119,764	42,445,000	360	14,255	11.9	3.2
France	206,776	39,300,000	190	27,307	13.3	7.0
United Kingdom	96,000	47,485,000	494	20,682	21.5	4.4
United States	3,027,000	131,669,000	43	251,819	8.3	18.6
Germany (proper)	186,080	73,692,000	395	38,884	20.8	5.3

TABLE VII - 21

BULGARIA, PRIVATE INDUSTRIAL AND OTHER RAILROAD SIDINGS

A. STANDARD GAUGE

Type of Establishment	Owner	Point of Junction Railroad Station	Length Met.	Length Yds.
1 Ceramics	Izidk	Novoseltsi	663	725
2 Sugar mill	Sugar Co.	Zaharna-Fabrika	595	651
3 Distillery	T. Balabanov	Mezdra	866	947
4 Distillery	Holding Co.	Plovdiv	207	227
5 Steam mill	P. Petrov	Yambol	465	508
6 Steam mill	Bonev-Penchev	Kharmanli	269	294
7 Steam mill	Nadezhda	Voenna-Rampa	612	669
8 Former distillery	Yantra	Gorna Orek-hovitsa	536	586
9 Sugar mill	Bulgarian Czech Company	Gorna Orek-hovitsa	4,825	5,279
10 Cement	Granitoid	Batanovtsi	358	391
11 Elevator	Food Export Directorate	Blgarovo	2,695	2,948
12 Sugar mill	Bulgarian Co.	Filipovo	2,883	3,153
13 Brewery	Brewing Co.	Shumen	5,510	6,028
14 Sugar mill	Sugar Co.	Ruse	1,641	1,795
15 Steam mill	Bulgarian Commercial Bank	Cherven-Breg	255	279
16 Vegetable oils	Olivia	Zemen	183	200
17 Bricks	Rabotnik	Voennen Arsenal	240	262
18 Military line	Ministry of War	1.5 km. beyond Vrattsa	715	782
19 Coal mine	Mining Co.	Plachkovtsi	685	749
20 Mineral oils	Petrol	Burgaz Port	390	426
21 Petroleum	Petrol	Ruse	1,335	1,460
22 Steam mill	A. Peltekov	Plovdiv	533	583
23 Great mills	Holding Co.	Burgaz	1,072	1,173
24 Mill	Stoyanov Brothers	Kreta	133	145
25 Steam mill	Keleshov Brothers	Chirpan	218	238
26 Mill	R. Lambrev	Kyustendil	190	208
27 Mill (water and steam)	N. Sapundzhiv	Ferdinand	223	244
28 Chemical	Company for Chemical Production	Kostinbrod	470	514
29 Repair shop for cars and engines	Cars and Engines Factory, Holding Company	Sofiya	588	643
30 Portland cement depot	Granitoid	Podueni	327	357
31 Vegetable oil factory	Refina	Varna	380	415
32 Petroleum depots	Petrol	Plovdiv	194	212
33 Petroleum depot	Bulgarian Agricultural Bank	Belozem	218	238
34 Mill	Record	Gavren	285	312

TABLE VII - 21 (*Continued*)

	Type of Establishment	Owner	Point of Junction Railroad Station	Length Met.	Length Yds.
35	Repair shop for railroad cars and engines	First Bulgarian Factory of railroad cars and engines	Kr. Batalion	195	213
36	Glass factory	Holding Company	Belevo	1,136	1,243
37	Brick factory	Tundzha	Yambol	261	285
38	Mill	Ustrem	Devna	654	715
39	Power station	Electrical Company in Sofiya and Bulgaria	Kurilo	1,301	1,423
40	Nail factory	Veriga	Burgaz	332	363
41	Rice mill	Maritsa	Filipovo	408	446
42	Petroleum depot	Petrol	Burgaz	184	201
43	Mill	Orient	Levski	247	270
44	Boat, locomotive and car factory	Koralovag	Varna	707	773
45	Tile factory	Iliev Brothers	Brusartsi	528	577
46	Power station	Vucha	Plovdiv	1,405	1,537
47	Bricks and tiles	P. Kaʼopaktichev	Plovdiv	462	505
48	Ore depot	Plakalnitsa	Burgaz	88	96
49	Coal	Mina Pernik	Pernik	2,852	3,120
50	Coal mine	Cherno More	Burgaz Port	386	422
51	Vegetable oils and preserves factory	A. M. Chaliovsky & Sons	Burgaz	405	443
52	Privileged export slaughterhouse	Gvardin & Ramchikan	Levski	248	271
53	Cement	Lev	Lev	632	691
54	Vegetable oil factory	Mikhov, Tchevvenkov & Kolichev	Filipovo	157	172
55	Mill	Bugarchev's Sons	Podueni	426	466
56	Sugar mill	Bulgarska Zakhar	Dolna Mitropoliya	1,287	1,408
57	Mill	Br. Badzhev	Sofiya	314	343
58	Vegetable oils	Rafina	Podueni	306	334
59	Cotton mill	Tsar Boris	Varna	408	446
60	Slaughterhouse (Sofiya)	Klanitsa	Podueni	596	652
61	Glass	Bulgaria-Belgian Co. Cristal	Km. 34.390 on line Sofiya/Gor. Dzhumaya	262	286
62	Bed factory	Azmanov	St. Zagora	52	57
63	Paper mill	Maritsa	Kostenets-Banya	117	128
64	Petroleum depot	Petrol	Voenna-Rampa (Sofiya)	840	918
65	Paper mill	Sam Patak	Belovo	140	153
66	Depot	Granitoid	Kr. Batalion (Sofiya)	80	87
67	Tube factory	Bulgarian Tube Industry	Dragalevtsi (Sofiya)	130	142
68	Rice mill	Company for Industry and Commerce	Filipovo	330	361
69	Oil refinery	First Bulgarian Co. for Petroleum Industry	Ruse	400	437
70	Ceramics	Napreduk	Kaspichan	60	65
71	Public warehouse	Community of Sofiya	Sofiya	460	503
72	Textiles	Prince Kiril	Kurilo	244	267
73	Ceramics	Iv. Zhelezarev	Pleven	206	225
74	Oil refinery	Nacho Nachev	Ruse	323	353
	Total			50,328	55,038

B. NARROW GAUGE

1	Tile factory	G. Dimitrov	Km. 75.938 on line Dupnitsa/Petrich	560	613
2	Ceramics	Kitka	Novi/Pazar	165	181
3	Lumber mill	Mihailov	Km. 37.725 at Ladzhene station	68	74
4	Wool works	Yundola & Arab Gol	Km. 37.725 at Ladzhene station	50	55
5	Caolin factory	Co. Caolin Varna	Bozhidar	150	164
6	Lumber mill	A. Palankov	Km. 37.725 at Ladzhene station	63	68
	Total			1,056	1,155
	Grand total			51,384	56,193

TABLE VII - 22

BULGARIA, GRADES ON STANDARD- AND NARROW-GAUGE LINES OF NATIONAL RAILROADS

	Length of Sections in Bulgaria Km.	Mi.	Per Cent of Total Length of Line: Bulgaria	Germany	Italy	Rumania	Yugoslavia
A. Standard Gauge							
1. Level Sections	817	508	27.9	27.2	22.6	28.5	39.6
2. Sections on Grades							
(a) Up to 0.5%	802	498	27.4	39.7	37.7	46.7	37.1
(b) 0.5 to 1%	518	322	17.7	19.7	20.3	16.7	12.7
(c) 1 to 2.5%	791	492	27.0	12.6	17.3	8.0	10.0
(d) Over 2.5%	—	—	—	0.8	2.1	0.1	0.6
Total	2,111	1,312	72.1	72.8	77.4	71.5	60.4
Total Standard Gauge	2,928	1,820	100	100	100	100	100
B. Narrow Gauge							
1. Level Sections	119	74	27.1	21.6	20.5	29.4	21.6
2. Sections on Grades							
(a) Up to 0.5%	77	48	17.6	23.2	7.3	30.6	34.1
(b) 0.5 to 1%	70	44	16.0	16.0	6.0	22.0	18.1
(c) 1 to 2.5%	173	107	39.3	32.2	42.1	17.9	23.5
(d) Over 2.5%	—	—	—	7.0	24.1	0.1	2.7
Total	320	199	72.9	78.4	79.5	70.6	78.4
Total Narrow Gauge	439	273	100	100	100	100	100
Grand Total	3,367	2,093	100	100	100	100	100

Table VII - 23

BULGARIA, WATER SUPPLY FOR LOCOMOTIVES, 1935

No. of Line	Line	Length in Miles	No. of Water Stations	Max. Dist. Between Stations (Miles)	Method of Supply: Gravitation	Method of Supply: Mechanical	Method of Supply: Mixed Grav. and Mech.	Source: Spring Water	Source: Well Water	Source: River Water	Source: Mixed	Reservoir Capacity: Below 1,765 Cu. Ft.	Reservoir Capacity: 1,765 to 3,530 Cu. Ft.	Reservoir Capacity: Over 3,530 Cu. Ft.	Number of Spouts: 8 Inches	Number of Spouts: 6 Inches	Number of Spouts: 4 Inches	Number of Spouts: Other
1	Caribrod/Svilengrad	226	17	33	1	15	1	1	10	4	2	4	14	5	29	5	2	—
103	Voluyak/Bankya	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
104	Sofiya Loop Line	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14	Krumovo/Asenovgrad	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15	Rakovski/Momchilgrad	62	4	26	1	3	—	1	2	1	—	1	1	—	3	2	—	—
2, 19	Sofiya/Varna[1]	336	24	24	8	16	—	8	8	6	2	8	18	4	29	21	1	1
20	Iovkovo/Oborishte	32	3	14	1	2	—	1	1	—	1	—	3	—	—	6	—	—
116	Sindel/Staro Orehovo	17	1	—	1	1	—	1	—	—	—	—	1	—	1	—	—	—
111	G. Orekhovitsa/Leskovets	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2, 8	Pleven/Samovit[2]	26	1	15	—	1	—	—	1	—	—	1	—	—	1	—	—	—
2, 5	Sofiya/Makotsevo[3]	32	1	29	—	1	—	—	1	—	—	—	1	—	1	—	—	—
17	Ruse/St.-Zagora	160	11	27	3	8	—	2	7	2	—	1	10	—	9	10	—	3
110	Tsareva-Livada/Gabrovo	11	2	10	1	1	—	1	1	—	—	1	1	—	1	—	1	—
11	Tulovo/Kazanlk[4]	9	1	9	1	—	—	1	—	—	—	—	—	—	1	—	—	—
11	Dubovo/Zimnitsa[4]	58	2	27	1	1	—	1	1	—	—	—	2	—	3	—	1	—
12	Plovdiv/Burgaz	182	9	28	2	5	2	2	5	—	2	—	11	—	10	—	—	4
114	Yambol/Elhovo	27	1	27	—	1	—	—	1	—	—	—	1	—	—	—	—	1
113	Nova Zagora/Zlatidol	39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12, 107	Plovdiv/Karlovo[5]	42	3	21	—	3	—	—	3	—	—	—	1	—	—	4	—	—
12, 106	Plovdiv/Panagyurishte[5]	47	3	30	1	2	—	1	2	—	—	—	—	—	—	1	1	1
3, 4	Sofiya/Gyueshevo[6]	85	6	25	1	5	—	—	4	2	—	2	5	—	6	8	—	—
6, 7	Mezdra/Vidin[7]	112	5	28	—	5	—	—	4	1	—	—	4	—	7	5	—	—
6	Brusartsi/Lom[8]	14	1	14	—	1	—	—	—	1	—	—	1	—	—	—	—	—
102	Boichinovtsi/Berkovitsa	22	2	14	—	2	—	—	1	—	1	—	2	—	1	2	—	—
3	Radomir/Dupnitsa[9]	27	1	27	1	—	—	—	—	1	—	—	1	—	1	—	—	—
9, 10	Svishtov/Lovech	59	2	30	1	1	—	1	—	1	—	—	2	—	—	3	—	—
9, 109	Svishtov/Belene[10]	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19	Ruse/Kaspichan[11]	88	3	32	1	2	—	1	1	—	1	—	1	2	2	4	—	—
	TOTAL	1,760	103	*33	25	76	3	22	53	19	9	18	80	11	105	71	6	10

[1]Includes Kaspichan/Varna section of line 19 (Ruse/Kaspichan/Varna).
[2]Includes Pleven/Yasen (line 2).
[3]Includes Sofiya/Ilientsi (line 2).
[4]Section of line 11.
[5]Includes Plovdiv/Filipovo, section of line 12.
[6]Includes Sofiya/Vrba (line 4).
[7]Includes Mezdra/Brusartsi, section of line 6.
[8]Section of line 6.
[9]Section of line 3.
[10]Includes Svishtov/Oresh, section of line 9.
[11]Section of line 19.

*Note: Greatest distance between stations on lines is 33 miles—one line, 39 miles long (Nova Zagora/Zlatidol), has no water station.

TABLE VII - 24
BULGARIA, CURVES ON STANDARD- AND NARROW-GAUGE LINES OF NATIONAL RAILROADS

	Length of Sections Bulgaria Km.	Mi.	Per Cent of Total Length of Line Bulgaria	Germany	Italy	Rumania	Yugoslavia
A. Standard Gauge							
1. Straight Sections	1,906	1,184	65.1	66.7	68.9	77.0	73.2
2. Sections on Curves							
(a) With radius of 500 meters (1,640.4 ft.; 3° 30′) and over	451	280	15.4	20.7	18.5	10.5	12.3
(b) With radius less than 500 meters (1,640.4 ft.; 3° 30′)	571	355	19.5	12.6	12.6	12.5	14.5
Total	1,022	635	34.9	33.3	31.1	23.0	26.8
Total Standard Gauge	2,928	1,819	100	100	100	100	100
B. Narrow Gauge							
1. Straight Sections	269	167	61.3	59.9	50.7	74.4	61.3
2. Sections on Curves							
(a) With radius of 500 meters (1,640.4 ft.; 3° 30′) and over	11	7	2.4	6.1	20.2	3.6	8.8
(b) With radius less than 500 meters (1,640.4 ft.; 3° 30′)	159	99	36.3	34.0	29.1	22.0	29.9
Total	170	106	38.7	40.1	49.3	25.6	38.7
Total Narrow Gauge	439	273	100	100	100	100	100
Grand Total	3,367	440	100	100	100	100	100

TABLE VII - 25
BULGARIA, STANDARD- AND NARROW-GAUGE LOCOMOTIVES AND RAILCARS, 1938

	Standard Gauge Number	Narrow Gauge Number
I. Locomotives		
1. Tender Locomotives		
2 coupled axles (2 pairs of drivers)	1	—
3 coupled axles (3 pairs of drivers)	21	—
4 coupled axles (4 pairs of drivers)	151	—
5 coupled axles (5 pairs of drivers)	167	—
Total Tender Engines	340	—
2. Tank Locomotives		
2 coupled axles (2 pairs of drivers)	—	3
3 coupled axles (3 pairs of drivers)	83	17
4 coupled axles (4 pairs of drivers)	3	85
5 coupled axles (5 pairs of drivers)	34	6
6 coupled axles (6 pairs of drivers)	22	—
Total Tank Engines	142	111
Total Number of Locomotives	482	111
II. Railcars		
Internal Combustion	4	—

TABLE VII - 26
BULGARIA, TYPES OF NARROW-GAUGE TANK LOCOMOTIVES, 1937

Series	Type	Builder	Locomotive Numbers	Date of Construction	Wheel Arrangement*	Weight, Empty (Short Tons) Engine	Tenders	Total	Axle Load (Met. Tons)	Brakes[3]	Maximum Speed (M.P.H.)	Capacity of Tanks Water (Cu. Ft.)	Coal (Short Tons)	Approximate Number in Each Class
					2′ 6″ Gauge									
T76 2/2	Switching	?	?	?	0-4-OT	19.9	—	19.9	9	L.	under 31	213.5	2.2	1
T76 3/4	Mixed tr.	?	?	?	2-6-OT	33.0	—	33.0	9	L.	under 31	140.0	.9	10
T76 4/4	Mixed tr.	?	?	?	0-8-OT	22.5	—	22.5	5	L.	under 31	140.0	.9	1
T76 5/5	Mixed tr.	Ceskomoravska Praha; Berlin, M.A.G.	501-506	1927	0-10-OT	51.8	—	51.8	9.5	L. or L.H.	under 31	213.5	2.2	6
					1′ 11½″ Gauge									
T60 2/2	Switching	?	?	?	0-4-OT	7.1	—	7.1	3.3	L.	under 31	10.5	0.16	3
T60 3/3	Mixed tr.	?	?	?	0-6-OT	9.9	—	9.9	3.0	L.	under 31	31.5	0.27	9
T60 4/4[1]	Mixed tr.	Henschel[2]	401-500	1916	0-8-OT	14.7	—	14.7	3.3	L.	under 31	38.5	0.33	91 or less
			1001-1150	1918										

Total Narrow-Gauge Locomotives 121

[1]There are 64 tenders for attachment to these tank locomotives; weight empty 11.5 short tons, capacity 175 cu. ft. and 1.6 short tons coal.
[2]Germany.
[3]Brake Legend: L.—Hand lever. H.—Hardy (vacuum).
*Whyte's Notation (American System).

TABLE VII - 27
BULGARIA, STANDARD- AND NARROW-GAUGE PASSENGER AND BAGGAGE CARS, 1938

	Passenger Cars Standard Gauge	Narrow Gauge	Baggage Cars Standard Gauge	Narrow Gauge
2 axles	192	—	159	—
3 axles	279	—	67	—
4 axles	117	120	19	50
6 axles	1	—	—	—
Total	589	120	245	50

	Passenger Cars Standard Gauge	Narrow Gauge	Baggage Cars Standard Gauge	Narrow Gauge
Average number of axles per car	2.88	4	2.43	4
Total number of seats	31,562	2,937		
Seating capacity per car	53.6	24.5		

TABLE VII - 28

BULGARIA, TYPES OF STANDARD-GAUGE LOCOMOTIVES, 1937

Series	Type	Builder	Date of Construction	Locomotive Number	Wheel Arrangement*	Weight Empty (Short Tons) Engine	Tender	Total	Total Weight In Service (Short Tons)	Axle Load (Met. Tons)	Brakes[7]	Maximum Speed (M.P.H.)	No. of Axles	Tenders Capacity Water Cu. Ft.	Tenders Capacity Coal Short Tons	Number of Locomotives in Each Class		Remarks
A. Tender Locomotives																		
Sc 3/5	Express	Maffei[1]	1904	1/20	4- 6-0	63.4	4.7	88.1	122.4	14	H-W	37-56	4	637	7.0	17		
Sc 3/6	Express	Cockerill[2]	1901/9	21	4- 6-2	80.0	23.5	103.5	146.7	14	H-hand	37-56	4	700	11.0			Rebuilt 1933 (Sofiya)
Sz 4/6	Express	Hanomag[1]	1931/2	8.001-8.013	2- 8-2	100.0	30.2	130.2	185.3	17	H.L.K.	37-56	4	1050	12.1	11 to 13	23	Possibly some by Hanomag
(Illusts. VII - 21 and VII - 22)																		
Sz 4/6	Express	Pieraska[3]	1935	8.013-8.025	2- 8-2	97.8	30.7	128.5	185.1	17	H.L.K.	37-56	4	1050	12.1	10 to 12		
Sd 4/6	Express		1935/6	—	2- 8-2	102.0	31.3	133.3	188.2	17	H.L.K.	37-56	4	1050	12.1	2		—
Pc 3/3	Passenger	(British ?)	1891/9	1.881/5	0- 6-0	41.0	14.3	55.3	80.0	15	H.	19-31	3	336	5.6	4		Poor condition
Pc 4/5	Passenger	Henschel[1]	1913/8	801-42	2- 8-0	82.3	22.0	104.3	148.0	16	H.L.	37-56	3	700	11.0	42	71	—
Pc 4/5	Passenger	Henschel[1]	1921/6	843-74	2- 8-0	52.7	20.2	72.9	106.7	16	K.L.	37-56	3	630	8.8	29		—
Pc 4/6	Passenger	Henschel[1]	1911/9	—	2- 8-2	79.2	24.6	103.8	146.7	16	H.L.K.	37-56	3	577.5	7.7	1		—
Pc 5/6	Passenger	Hanomag[1]	1913/8	901-970	2-10-0	83.6	20.3	103.9	138.6	15	H.L.	37-56	3	630	7.7	70		—
Pc 5/6	Passenger	Schwartzkopf[1]	1931/3	9.001/10	2-10-0	100.6	29.1	129.7	185.9	15	H.L.K.	37-56	4	1050	12.1	10	86	—
Pc 5/6	Passenger	" and Krupp[1]	1935	10.01/06	2-10-0	100.4	32.1	132.5	199.1	17	H.L.K.	37-56	4	1050	12.1	6		—
(Illlust. VII - 19)																		
Gz 4/4	Freight	?	1897/9	—	0- 8-0	48.4	13.9	62.3	84.5	12.2	L.	19-31	3	367.5	6.6	4		Poor condition
Gc 2X2/5	Freight	Maffei[1]	1890/9	—	2-4+4-0	66.6	22.8	89.4	122.9	14	W.	19-31	4	630	6.6	1		—
(Illusts. VII - 18(a) and VII - 18(b))																		
Gc 4/4	Freight	Egestorff[1] Wienerneustadt[4]	1891-1908	200-400	0- 8-0	54.1	14.8	68.9	96.6	14	H.L.	19-31	3	339.5	7.1	31		Obsolete
Gc 4/5	Mixed traffic	Hanomag[1]	1901/9	701-717	2- 8-0	67.1	20.1	87.2	119.6	14	H.L.	31-37	3	595	6.6	16		—
Gc 5/5	Freight	Maffei[1]	1901/9	501-513	0-10-0	66.0	18.3	84.3	113.2	14	H.L.	19-31	3	525	6.6	13		—
Gc 5/5	Freight	Hohenzollern[1]	1911/20	514-544	0-10-0	66.0	18.3	84.3	113.2	14	H.L.	19-31	3	525	6.6	31	81	—
Gc 5/5	Freight	Hanomag[1]	1920/6	544-581	0-10-0	66.0	18.3	84.3	113.2	14	H.L.	19-31	3	525	6.6	37		—
(Illust. VII - 17)																		
B. Tank Locomotives																		
Tz 3/3	Switching	Maffei[1]	1897-1910	1001-18	0-6-OT	34.8	—	34.8	47.7	14	L.	19-31	—	(182)[6]	(1.6)[6]	18		—
Tz 3/3	Switching	Ceskomoravska[5]	1925	1020-40	0-6-OT	34.8	—	34.8	47.7	14	L.	19-31	—	(182)	(1.6)	20	38	—
Tz 3/5	Local pass.	?	1897	2001-08	2-6-2T	56.3	—	56.3	74.0	14	L.	31-37	—	(245)	(2.2)	8		—
Tz 3/5	Local pass.	Hanomag[1]	1910/16	2009-20	2-6-2T	56.3	—	56.3	74.0	14	L.	31-37	—	(245)	(2.2)	12	45	4 rebuilt in 1933
Tz 3/5	Local pass.	Schwartzkopf[1]	1921	2021-45	2-6-2T	56.3	—	56.3	74.0	14	L.	31-37	—	(245)	(2.2)	25		—
(Illust. VII - 20)																		
Tz 4/5	Freight	?	1921/9	1401-3 3001-25	2- 8-OT	57.8	—	57.8	79.8	15	H.L.S.	19-31	—	(315)	(5.5)	3		—
Tz 5/5	Switching frt.	Schwartzkopf[1]	1917	3501-10	0-10-OT	63.4	—	63.4	79.8	14.5	L.	19-31	—	(315)	(5.5)	34		9 rebuilt 1933/6
Tz 6/6	Heavy frt.	Hanomag[1]	1922	4001-10	0-12-OT	84.1	—	84.1	111.1	17	L.K.	28	—	(420)	(5.5)	10		Pernik Line
Tz 6/9	Mixed traffic	Cygielski[3] (Poznan)	1931/2	4601-12	2-12-4T	122.1	—	122.1	163.9	17	H.L.K.	40	—	(630)	(11.0)	12		Used on Trans-Balkan line. Tz 6/9 and Pc 5/6 have interchangeable parts
(Illusts. VII - 16(a) and VII - 16(b))																		
																Total Standard-Gauge Locomotives		482

[1]Germany.
[2]Great Britain.
[3]Poland.
[4]Austria.
[5]Czechoslovakia.
[6]Figures in parenthesis: tank capacities of tank locomotives.

[7]Brakes Legend: L.—Hand-lever.
H.—Hardy (vacuum).
K.—Knorr (compressed air).
S.—Steam brake.
W.—Westinghouse.

*Whyte's Notation (American System). *See also Illustrations 15 - 22.*

TABLE VII - 29
BULGARIA, TYPES OF STANDARD-GAUGE PASSENGER CARS, 1937

Series	No. at End of Year	Average No. of Axles	Average Seating Capacity per Car	Average Tare Wt. per Car Metric Tons
I. Private cars				
S 3 axles	6	3	—	17.1
S 4 axles	5	4	—	38.4
S 6 axles	1	6	—	56.4
Total	12	(3.7)	—	(29.2)
II. Passenger cars				
AB 2 axles	6	2	25	20.6
AB 3 axles	35	3	28.2	20.1
AB 4 axles	44	4	42.4	38.4
Total	85	(3.4)	(34.7)	(29.2)
B 3 axles	12	3	32.1	19.8
BC 3 axles	7	3	49.5	15.3
PC 3 axles	5	3	30.0	16.5
C 2 axles	164	2	65.2	20.4
C 3 axles	204	3	57.9	18.9
C 4 axles	64	4	86.6	39.2
Total C Series	432	(2.8)	(45.0)	(22.7)
Total II	541	(2.9)	(58.9)	(23.5)
Grand Total I and II	553	(2.9)	(57.1)	(23.5)
III. Service cars				
Hospital, prisoner and wreckage cars (not included above)				
Sa 3	1	3	—	24.0
Sb 2	4	2	—	14.0
Sb 3	9	3	—	15.9
Sb 4	1	4	—	32.8
Sz 3	1	3	—	16.5
FSA 2	6	2	—	11.0
FN 2	12	2	—	10.2
FN 4	5	4	—	20.0
Total	39	2.6	—	14.6
Special cars *				
WL and WR (sleeping and dining cars)	21	4	—	36.4

TABLE VII - 30
BULGARIA, TYPES OF STANDARD-GAUGE MAIL AND BAGGAGE CARS, 1937

Series	No. at End of Year	Av. No. of Axles	No. with Handbrakes	Average Tare Wt. per Car Metric Tons
I. Mail cars				
P. 2 axles	2	2	2	22.6
P. 3 axles	21	3	21	18.0
P. 4 axles	17	4	17	34.8
Total	40	(3.4)	40	(25.5)
II. Baggage cars				
D 2 axles	110	2	110	14.0
D 3 axles	46	3	46	15.6
D 4 axles	2	4	2	31.2
7D 2 axles	47	2	47	10.4
Total	205	(2.2)	205	(13.4)

TABLE VII - 31
BULGARIA, STANDARD- AND NARROW-GAUGE FREIGHT CARS, 1938

Series	Standard Gauge Number	Standard Gauge Average Loading Capacity Metric Tons	Narrow Gauge Number	Narrow Gauge Average Loading Capacity Metric Tons
A. Box cars				
2 axles	(a)	—	—	—
3 axles	(a)	—	—	—
4 axles	(a)	—	141	—
Total	4,256	14.8	141	(a)
Average number of axles per car	2	—	4	—
B. Open cars				
2 axles	(a)	—	—	—
3 axles	(a)	—	—	—
4 axles	(a)	—	840	—
Total	5,083	17.6	840	(a)
Average number of axles per car	2.05	—	4	—
C. Special cars	63	13.4	48	(a)
Average number of axles per car	2	—	4	—
Total owned by national railroads	9,402	16.2	1,029	(a)
Number of axles per car —all cars	2.03	—	4	—
D. Private cars (Operated on national railroads)	181	—	285	—
Average number of axles per car	2.22	—	4	—
Grand Total	9,583	—	1,314	—

(a) No information.

TABLE VII - 32
BULGARIA, TYPES OF STANDARD-GAUGE FREIGHT CARS, 1937

Series	No. at End of Year	Aver. No. of Axles	No. With Hand-brakes	Aver. Wt. Metric Tons	Aver. Tare Wt. per Car Metric Tons
A. Box cars					
F Standard box cars	3,696	2	1,833	15.0	10.0
F Large box cars	4	4	4	20.0	17.2
Fo Cars for raisins	302	2	256	15.0	9.8
Fg Cars for fowl	71	2	71	11.0	12.6
Fk Refrigerator cars	62	2	62	13.2	17.8
G Livestock cars	10	2	10	15.0	12.4
E Cars for bulk commodities	129	2	129	15.0	11.6
Total	4,274	(2.0)	2,365	(14.8)	(9.8)
B. Open cars					
J Standard					
15-ton capacity	1,862	2	798	15.0	7.8
20-ton capacity	2,129	2	1,148	20.0	8.4
JK Cars for lumber	125	2	61	15.8	9.6
L Cars for large commodities	98	2	47	16.0	8.4
K Flat cars					
2 axles	20	2	3	15.0	8.6
4 axles	77	4	68	34.8	17.6
Ob Gravel cars	48	4	48	30.0	18.8
M Cars for stone, etc	804	2	244	14.8	8.2
Total	5,163	(2.1)	2,417	(17.9)	(8.6)
C. Tank cars					
Ww For water	2	2	2	10.0	6.8
Gw For manufactured gas	6	2	6	—	17.2
Pw For petroleum products	55	2	55	15.0	12.0
Total	63	2	63	13.4	13.8
Grand Total (A, B, and C)	9,500	(2.0)	4,845	(16.0)	(9.0)
D. Service cars					
Z 3 and 4	3	4	3	14.8	44.0
Sm 2 axles	1	4	1	—	66.5
Do 3 axles	3	2	3	—	17.4
Total	7	(3.3)	7	(—)	(36.0)

TABLE VII-32 (*Continued*)

Series	No. at End of Year	Aver. No. of Axles	No. With Hand-brakes	Aver. Wt. Metric Tons	Aver. Tare Wt. per Car Metric Tons
E. Special cars					
Fg Cars for fowl	9	2	9	12.0	13.8
Gw Cars for cement	30	2	30	15.0	7.4
Pw Cars for petroleum products	119	2	117	15.0	8.6
Fk Refrigerator cars	3	2	3	15.0	15.4
Total	161	(2)	159	(14.6)	(7.6)
GRAND TOTAL FREIGHT CARS	9,668	(2)	5,011	(16.0)	(9.0)

TABLE VII - 33
BULGARIA, REPAIR SHOPS*

A. Major work shops
   1. Sofiya ..... Locomotives and cars
   2. Plovdiv ..... Locomotives
   3. Gorna Orekhovitsa .... Locomotives
B. Running repair shops
   1. Radomir
   2. Burgaz
   3. Stara-Zagora
   4. Ruse
   5. Varna
C. Private repair shops
   1. Drenovo ..... Cars (Zaravina Co.)
   2. Varna ..... Cars (Koralovag Co.)

*See Plan VII - 1.

TABLE VII - 34
BULGARIA, ROUNDHOUSES†

	Size*
1. Caribrod/Svilengrad	
(a) Dragoman	(a)
(b) Sofiya	large
(c) Saranovo	small
(d) Plovdiv	medium
(e) Rakovski	small
(f) Zlati-dol	(a)
(g) Svilengrad	small
2. Sofiya/Kaspichan (/Varna)	
(a) Sofiya	large
(b) Mezdra	small
(c) Cherven-Breg	(a)
(d) Pleven	small–medium
(e) Levski	(a)
(f) Gorna Orekhovitsa	medium
(g) Shumen	small
(h) Kaspichan	small
(i) Varna	medium
3. Sofiya/Radomir/Simitli	
(a) Sofiya	large
(b) Pernik	medium
(c) Radomir	(a)
(d) Simitli (b)	(a)
4. (Sofiya/) Vrba/Gyueshevo	
(a) Gyueshevo	small
5. Ilientsi/Makotsevo (c)	
6. Mezdra/Lom	
(a) Mezdra	small
(b) Boichinovtsi	(a)
(c) Brusartsi	small
(d) Lom	small
7. Brusartsi/Vidin	
(a) Brusartsi	small
(b) Vidin	small
8. Yasen/Somovit/Nikopol (c)	
9. Levski/Svishtov	
(a) Levski	(a)
(b) Svishtov	small
10. Levski/Lovech	
(a) Levski	(a)
11. Zimnitsa/Dubovo/Sopot	
(a) Zimnitsa	(a)
(b) Sliven	small

Large Roundhouses—capacity, ten locomotives and over.
Medium Roundhouses—capacity, three to ten locomotives.
Small Roundhouses—capacity, less than three locomotives.
†See Plan VII - 1.

TABLE VII-34 (*Continued*)

	Size*
12. Plovdiv/Burgaz	
(a) Plovdiv	medium
(b) Stara-Zagora	small–medium
(c) Nova Zagora	small
(d) Yambol	small
(e) Zimnitsa	(a)
(f) Burgaz	medium
13. Krichim/Peshtera (c)	
14. Krumovo/Asenovgrad (c)	
15. Rakovski/Momchilgrad	
(a) Rakovski	small
(b) Momchilgrad	(a)
16. Mikhailovo/Rakovski	
(a) Rakovski	small
17. Ruse/Stara-Zagora	
(a) Ruse	small–medium
(b) Bela	(a)
(c) Gorna Orekhovitsa	medium
(d) Tsareva-Livada	(a)
(e) Plachkovtsi	(a)
(f) Stara-Zagora	small–medium
18. Shumen/Karnobat	
(a) Shumen	small
(b) Karnobat	(a)
19. Ruse/Varna	
(a) Ruse	small–medium
(b) Kaspichan	small
(c) Varna	medium
20. Iovkovo/Oborishte (c)	
101. Vidin/Vidin Port	
(a) Vidin	small
102. Boichinovtsi/Berkovitsa	
(a) Berkovitsa	(a)
103. Voluyak/Bankya (c)	
104. Sofiya Loop Line	
(a) Sofiya	large
105. Pernik Branch Line	
(a) Pernik	medium
106. (Plovdiv/) Filipovo/Panagyurishte	
(a) Plovdiv	medium
107. (Plovdiv/) Filipovo/Karlovo	
(a) Plovdiv	medium
108. Dolna Makhala/Khisar (c)	
109. Oresh/Belene (c)	
110. Tsareva-Livada/Gabrovo	
(a) Tsareva-Livada	(a)
111. Gorna Orekhovitsa/Leskovets	
(a) Gorna Orekhovitsa	medium
112. Ruse Loop Line	
(a) Ruse	small–medium
113. Zlati-dol/Nova Zagora	
(a) Zlati-dol	(a)
(b) Nova Zagora	small
114. Yambol/Elkhovo	
(a) Yambol	small
115. Tsar-Krum/Preslav (c)	
116. Sindel/Staro Orekhovo (c)	
117. Burgaz/Pomoriye	
(a) Burgaz	medium
201. Dupnitsa/Bobov-dol (c)	
202. Kocherinovo/Rilski Mnastir (c)	
203. Simitli/Petrich	
(a) Simitli (b)	
204. General Todorov/Kulata (c)	
205. Saranovo/Chepino/Iztok/Bansko	
(a) Saranovo	small
206. Pazardzhik/Varvara (c)	
207. Cherven-Breg/Orekhovo	
(a) Cherven-Breg	(a)
208. Kaspichan/T. Ikonomovo (Krania)	
(a) Kaspichan	small
209. Ruzhitsa/Bozhidar (c)	
210. Burgaz/Sarafovo/Rudnik	
(a) Burgaz	medium

(a) No information.
(b) New temporary shed probably built, due to conversion to standard gauge.
(c) No roundhouses reported.

TABLE VII - 35
BULGARIA, SWITCHING YARDS*

	Connections With the Following Lines
1. Svilengrad	Line 1
2. Plovdiv	Lines 1, 12, 106 and 107
3. Sofiya	Lines 1, 2, 3 and 104
4. Dragoman	Line 1
5. Gorna Orekhovitsa	Lines 2, 17 and 111
6. Varna (*a*)	Line 19
7. Shumen	Lines 2 and 18
8. Karnobat	Lines 12 and 18
9. Mikhailovo	Lines 12 and 16
10. Rakovski	Lines 1, 15 and 16
11. Pazardzhik	Lines 1 and 206
12. Saranovo	Lines 1 and 205
13. Pernik	Lines 3 and 105
14. Ruse	Lines 17, 19, 112, 306, 307 and 308
15. Stara-Zagora	Lines 12 and 17
16. Burgaz	Lines 12, 117 and 210

(*a*) Extension reported to be under construction, with capacity of 300 tank wagons (May 1940).

*See Plan VII - 1.

TABLE VII - 36
BULGARIA, CAPACITIES OF RAILROAD LINES UNDER NORMAL OPERATING CONDITIONS*

	Number of Trains per Day in Each Direction	Average Gross Weight per Train (*a*)		Net Load per Train		Average Daily Net Load in Each Direction	
		Metric Tons	Short Tons	Metric Tons	Short Tons	Metric Tons	Short Tons
A. *Principal Lines*							
1. Caribrod/Svilengrad							
(a) Caribrod/Plovdiv	16	770	847	385	423	6,160	6,776
(b) Plovdiv/Svilengrad	12	660	726	330	363	3,960	4,356
2. Sofiya/Kaspichan (/Varna)							
(a) Sofiya/Gorna Orekhovitsa	16	770	847	385	423	6,160	6,776
(b) Gorna Orekhovitsa/Kaspichan	12	440	484	220	242	2,640	2,904
3. Sofiya/Radomir/Simitli							
(a) Sofiya/Pernik	16	770	847	385	423	6,160	6,776
(b) Pernik/Simitli	12	550	605	275	302	3,300	3,630
4. (Sofiya/) Vrba	12	550	605	275	302	3,300	3,630
5. Ilientsi/Makotsevo/Gyueshevo	12	440	484	220	242	2,640	2,904
6. Mezdra/Lom	14	550	605	275	302	3,850	4,235
7. Brusartsi/Vidin	12	550	605	275	302	3,300	3,630
8. Yasen/Somovit/Nikopol	12	660	726	330	363	3,960	4,356
9. Levski/Svishtov	12	660	726	330	363	3,960	4,356
10. Levski/Lovech	12	550	605	275	302	3,300	3,630
11. Zimnitza/Dubovo/Sopot							
(a) Zimnitza/Dubovo (*b*)	12	440	484	220	242	2,640	2,904
(b) Dubovo/Sopot (*b*)	12	550	605	275	302	3,300	3,630
12. Plovdiv/Burgaz	12	550	605	275	302	3,300	3,630
13. Krichim/Peshtera	12	550	605	275	302	3,300	3,630
14. Krumovo/Asenovgrad	12	550	605	275	302	3,300	3,630
15. Rakovski/Momchilgrad	12	440	484	220	242	2,640	2,904
16. Mikhailovo/Rakovski	12	660	726	330	363	3,960	4,356
17. Ruse/Stara-Zagora							
(a) Ruse/Plachkovtsi (*b*)	12	770	847	385	424	4,620	5,082
(b) Plachkovtsi/Stara-Zagora (*b*)	12	550	605	275	302	3,300	3,630
18. Shumen/Karnobat	14	660	726	330	363	4,620	5,082
19. Ruse/Varna	12	440	484	220	242	2,640	2,904
20. Iovkovo/Oborishte	12	550	605	275	302	3,300	3,630
B. *Other National Lines* (Standard-gauge)							
107. (Plovdiv/) Filipovo/Karlovo	12	440	484	220	242	2,640	2,904
109. Oresh/Belene	12	550	605	275	302	3,300	3,630
113. Zlati-dol/Nova Zagora	10	550	605	275	302	2,750	3,025
116. Sindel/Stara Orekhovo	10	440	484	220	242	2,200	2,420
C. *Other National Lines* (Narrow-gauge)							
203. Petrich/Simitli	10	220	242	100	110	1,000	1,100
204. General Todorov/Kulata	10	220	242	100	110	1,000	1,100
205. Bansko/Saranovo	8	88	97	40	44	320	352
207. Cherven-Breg/Orekhovo	8	88	97	40	44	320	352
210. Burgaz/Sarafovo/Rudnik	8	110	121	50	55	400	440

(*a*) Trailing weight (not including locomotives and tenders).
(*b*) With simultaneous movements on both lines 11 and 17, number of trains on line 11 depends on use of line 17.

*See Figure VII - 4.

TABLE VII - 37
BULGARIA, BRIDGES
INVENTORY AND DESCRIPTIONS OF PRINCIPAL RAILROAD BRIDGES

1.* Caribrod/Svilengrad.

13 masonry and 35 iron girder bridges between Sofiya and Vakarel
14 masonry and 24 iron girder bridges between Vakarel and Belovo
13 masonry and 178 iron girder bridges between Belovo and Svilengrad

Total 40 masonry and 237 iron girder bridges

NAME	LOCATION	DESCRIPTION
1.† Ezhevitsa River bridge	6 mi. ESE of Caribrod and 5 mi. NW of Dragoman. 2.5 mi. from Letnitsa station.	Length 98 ft. Single track. Height 39 ft. above water. One steel span, simple truss construction, end blocks of granite masonry. One of two bridges in Dragoman Pass. Deepest RR cut with wall 1,150 ft. high is on N bank of river, immediately E of bridge and extends for about 4,500 ft. Probably most vulnerable point in Dragoman Pass because of landslides.
2. Ezhevitsa River bridge	2½ mi. NNW of Dragoman. 1.5 mi. from Letnitsa station.	Length probably between 82 and 115 ft. Single track. Height approx. 33 ft. above water. Iron bridge on granite masonry and blocks. N and W of bridge RR continues on retaining walls through deep cuts. Single span.
3. Belitsa River bridge (Kostinbrod)	1.9 mi. SE of Kostinbrod station.	Length approx. 100 ft. Single span.
4. Iskr bridge	6 mi. E of Sofiya. 1.2 mi. E of Iskr station.	Length 393 ft., 3 spans 131 ft. each. Single track. Height approx. 33 ft. from water to rails. Iron: masonry piers.
5. Pobit Kamik RR and road viaducts (Vakarel)	3 mi. NW of Vakarel, 19 mi. SE of Sofiya.	Highway viaduct slightly to W of RR bridge. These viaducts were filled in and converted into embankments. Former RR viaduct 501 ft. long. Height 126 ft. Width about 13 ft. Present highway viaduct 100 ft. long. Height 30 ft. Width approx. 23 ft.
6. Maritsa River bridge (Kostenets)	Just NW of Kostenets	Length 82 ft. Height 21 ft. Double track. Steel, simple truss, with ends resting on concrete blocks.
7. Maritsa River bridge (Sestrimo)	2½ mi. NW by W of Sestrimo.	Length 131 ft. Height 59 ft. Single track. Steel, simple span, end blocks of masonry. Danger of landslides.
8. Maritsa River bridge (Sestrimo)	1¾ mi. NW of Sestrimo.	Length 131 ft. Single track. Height 88 ft. Steel span, masonry blocks.
9. Maritsa River bridges A and B (Sestrimo)	Bridge A 490 ft. W of Sestrimo station. RR crosses 900-ft. wide peninsula formed by southern curve of river, then crosses bridge B 1,640 ft. W of station.	Bridge A 98 ft. long, single track, height 36 ft. Bridge B 98 ft. long, single track, height 26 ft.
10. Ellidere River bridge	2½ mi. E of Saranovo, 7½ mi. W of Pazardzhik, S of Maritsa River.	Length 157 ft., 2 spans 79 ft. each. Single track. Height approx. 19 to 26 ft.
11. Krichim River bridge	Between Plovdiv and Pazardzhik.	Length approx. 130 to 165 ft., 2 spans. Height approx. 20 ft. Single track. Steel, simple truss bridge.
12. Chaya River bridge (Stanimashka River)	6¼ mi. N of Asenovgrad. 3.7 mi. W of Katunitsa station.	Second largest bridge on Sofiya/Edirne sections. Length 295 ft., 3 spans of 98 ft. each. Single track. Height approx. 20 ft. above water. Steel spans, piers, and end foundations of masonry.
13. Mechka River bridge (Borisovgrad)	1½ mi. SE of Borisovgrad.	Length 114 ft. Width approx. 12 ft. Height approx. 20 ft. above water. Iron spans, stone masonry foundation.
14.	.9 mi. from Skobelevo station.	Viaduct. Length 165 ft. 2 spans.
15.	1.9 mi. from Rakovski station.	Length 165 ft. 2 spans.
16. Harmanli Viaduct	1.5 mi. N of Kharmanli station.	Length 131 ft., 2 spans each 65 ft. Single track. Height about 20 ft. from road to tracks. Steel, simple truss spans. Masonry piers.
17. Olu Dere River bridge	Between Zlati-dol and Edirne. 2,300 ft. NE of Kharmanli.	Length 216 ft., 1 span 98 ft. and 2 of 59 ft. Single track. Height above water approx. 25 ft. in dry season. Simple truss construction, granite masonry piers.

2. Sofiya/Kaspichan (/Varna)

185 bridges (48 over 32 ft. long). 135 metal, 48 stone, 2 ferroconcrete.

18. Iskr River bridge (Romcha)	1½ mi. NNE of Kurilo station. First bridge in the Iskr Gorge between Sofiya and Mezdra.	Length between 130 and 165 ft. Height about 33 ft. Single track. Steel, simple box truss, 2 spans, masonry pier, masonry walls. (There are 12 large steel bridges in the Iskr Gorge.)
19. Iskr River bridge (Lakatnik)	21 mi. N of Sofiya. 1½ mi. S of Lakatnik station.	Length approx. 190 ft. 2 steel spans and 1 masonry arch. Single track. Height above water 25 to 32 ft.
20. Iskr River bridge (Cherepich)	300 ft. E of Cherepich station. 6½ mi. E of Eliseina. 7 mi. SW of Mezdra Junction.	Length approx. 131–164 ft. Single track. Steel and masonry.
(Illusts. VII - 2 and VII - 3)		
21. Iskr River bridge (Cherven-Breg)	40 mi. SW of Pleven. 6 mi. S of Cherven-Breg.	Length 300 ft., 2 spans. 30-50 ft. high. 1/5 mi. to SW is 150 ft. single span bridge over Iskr River.
22. Vit River bridge	1 mi. E of Yasen station	Length 295 ft. Single track. Iron or steel spans, on 2 piers anchored to masonry abutments.
23. Osm River bridge	2 mi. E of Levski	Length 100 ft. 1 span. Single track.
24. Rositsa River bridge	2.5 mi. from M. Stambolovo station.	Length 165 ft. 2 spans.

*Line number on Figure VII - 2. †Bridge number on Figure VII - 2. Bridges selected on basis of length (over 100 ft.) or strategic location.

TABLE VII - 37 (*Continued*)

NAME	LOCATION	DESCRIPTION
3. Sofiya/Radomir/Simitli		
5 bridges on Sofiya/Radomir section between Vladaya and Radomir.		
3 masonry and 9 iron girder bridges between Radomir and Dupnitsa.		
25. Struma River bridge (Pernik)	4 mi. E of the Pernik mines.	100 ft. span over Struma River. Exposed area with much road traffic in vicinity.
26. Dzherman River bridge	Between Delian and Dupnitsa.	Also another bridge (120 ft. long approx.) immediately N of Dupnitsa station.
27. Rilska River bridge	Between Kocherinovo and Gorna Dzhumaya.	
28. Struma River bridge	Between Gorna Dzhumaya and Simitli.	At least 3 spans.
4. (Sofiya/) Vrba/Gyueshevo		
4 masonry and 25 iron girder bridges on Radomir/Kyustendil section.		
13 masonry and 14 iron girder bridges on Kyustendil/Gyueshevo section.		
5. Ilientsi/Makotsevo		
8 bridges over 10 mi. in length.		
29. Iskr River bridge (West branch)	5 mi. NE by N of Sofiya RR yards. (Illustration VII - 4)	2 bridges (near Ilientsi) over forks of Iskr River approx. 1/5 mi. apart. W branch 328 ft., 4 spans. E branch 246 ft., 3 spans. Single track. Iron, simple truss, concrete piers.
29(a). Makotsevo bridge. (Illustration VII - 5)		Stone arch bridge. About 90 feet over the Makotsevo River. South of village and west of the station. Approx. 100 ft. long.
6. Mezdra/Lom		
54 bridges (longest 395 ft.), 47 metal, 7 stone.		
7. Brusartsi/Vidin		
25 bridges (longest 350 ft.), 18 metal, 7 stone.		
8. Yasen/Somovit/Nikopol		
29 bridges between Yasen and Somovit. (Only 1 over 32 ft. long.) 21 metal, 4 stone, 4 wooden.		
9. Levski/Svishtov		
6 bridges (2 over 32 ft.), 5 metal, 1 stone.		
10. Levski/Lovech		
No large bridges.		
11. Zimnitsa/Dubovo/Sopot		
Zimnitsa/Dubovo: 55 bridges (10 over 32 ft. span, longest 130 ft.), 44 metal, 4 stone, 7 ferro-concrete.		
Tulovo/Kazanlk: 10 bridges. All metal, longest 53 ft.		
12. Plovdiv/Burgaz		
180 bridges. 165 metal, 15 stone. (Excluding section from Nova Zagora to Yambol for which no details are available.)		
30. Maritsa River bridge	2 mi. NW of Plovdiv RR yards and W of city. Bridge crosses Maritsa River in N–S direction.	Length 558 ft. 5 spans of 111 ft. each. Height approx. 20 to 26 ft. above normal water level. Simple truss, steel spans. End foundations, piers of masonry and concrete. Second largest bridge in Bulgaria.
31. Tundzha River bridge	Approx. 4½ mi. SW of Zimnitsa and about 6 mi. N of Yambol.	
32. Azmak Dere River bridge	Between Devetak and Karnobat.	RR follows Azmak Dere River through a narrow pass cut in volcanic rock.
13. Krichim/Peshtera		
8 bridges, 3 metal, 5 concrete.		
32(a). Stare River bridge	Between Bratsigovo and Peshtera.	Length 246 ft., 2 spans of 59 ft., 2 spans of 41 ft. Height 62 ft.
14. Krumovo/Asenovgrad		
Only 2 bridges and culverts with openings up to 10 ft.		
15. Rakovski/Momchilgrad		
61 bridges. 22 metal, 39 masonry.		
33. Arda River bridge (Illustration VII - 6.)	1½ mi. SE of Krdzhali.	Length 459 ft. 7 arches of 66 ft. each. Height about 15 ft. above water. Single track. Masonry piers, iron railings. Road to Momchilgrad also uses the RR bridge.
34. Syuyutliika River bridge (Illustration VII - 7)	N of Momchilgrad.	Length 100–150 ft. approx. Height 50 ft. Single track. Masonry blocks. 6 arches, 4 piers.
16. Mikhailovo/Rakovski		
4 bridges.		
35. Maritsa River bridge (Illustration VII - 8.)	Between Mariino and Rakovski.	Length 623 ft. 4 spans of 114 ft. each, 1 of 164 ft. Single track. Superstructure approx. 15–20 ft. above tracks. Iron or steel. Simple truss. Stone piers.
17. Ruse/Stara-Zagora		
12 masonry and 26 iron girder bridges between Ruse and Trnovo.		
31 masonry and 25 iron girder bridges between Trnovo and Plachkovtsi.		
8 masonry and 1 iron girder bridges between Plachkovtsi and Borushtitsa.		
5 iron girder bridges between Borushtitsa and Dubovo.		
7 masonry and 7 iron girder bridges between Dubovo and Stara-Zagora.		
58 masonry and 64 iron girder bridges (Total of 122 bridges)		

TABLE VII - 37 (*Continued*)

NAME	LOCATION	DESCRIPTION
36. Yantra River bridge (Bela)	½ mi. NE of Bela station.	Length 3 spans—200 to 250 ft. Single track. Height approx. 45 ft. Iron trestles, masonry piers.
(Illustration VII - 9.)		
37. Yantra River bridge (north railroad bridge) (Trnovo)		Length approx. 250 ft. Height 40 ft. from water to tracks. Single track. Steel spans and stone arches.
(Illustrations VII - 10 and VII - 11.)		
38. Yantra River bridge (south railroad bridge) (Trnovo)		Length approx. 160–200 ft. Height 40 ft. above water. Single track. Steel spans, masonry piers. Tunnel at both ends of the bridge.
(Illustration VII - 12.)		
39. Tundzha River bridge	14 mi. N of Stara-Zagora, 2 mi. S of Tulovo.	Length probably 150 ft. Single track. 15 ft. above water. Iron and steel, single truss. Anchored to masonry abutment.
18. Shumen/Karnobat		
About 22 bridges.		
40. Golema Kamchiya River bridge	At Zlokuchen station.	
19. Ruse/Varna		
69 bridges. 64 metal, 5 stone.		
41. Lake Devna Canal.	At Sindel station.	Length 110 ft., 2 spans, 33 ft. and 44 ft.
42. Provadiska River bridge	W of Varna at W end of Lake Devna. Varna/Shumen. Road runs 3 mi. N of bridge.	Length between 80 to 105 ft. Height 6 to 12 ft. above river. Single track.
20. Iovkovo/Oborishte		
No data.		
OTHER ROUTES		
113. Zlati-dol/Nova Zagora		
2 bridges between Radnevo and Gulubovo.		
43. Maritsa River bridge (Zlati-dol)	2,600 ft. NW of Zlati-dol station.	Length 820 ft. Single track. Iron or steel.
203. Simitli/Petrich (Narrow gauge)		
8 bridges reported.		
44. Struma River bridge (Kresna)	S of Kresna stop.	Length 330 ft. consisting of 150 ft. span, two 80 ft. spans, and one 110 ft. span. Bridge is in heavily wooded Kresna Gorge. Would be difficult to repair if destroyed during spring or fall flood seasons. Washouts have caused suspension of traffic for periods of one to three months.
45. Struma River bridge	Between General Todorov and Petrich.	Length 500 ft. Iron construction.

TABLE VII - 38

BULGARIA, INVENTORY AND DESCRIPTIONS OF PRINCIPAL RAILROAD TUNNELS

1.* Caribrod/Svilengrad
No tunnels.

2. Sofiya/Kaspichan/(Varna)
22 tunnels. Total length 12,600 ft., longest 1,440 ft.
1.† Between Rebrovo and Svoge. — Length 1,440 ft.
2. Between Karlukovo and Cherven Breg. — Length 590 ft.

3. Sofiya/Radomir/Simitli
On Radomir/Dupnitsa section, 3 tunnels, longest of which is 675 ft.
3. Between Kocherinovo and Rilska bridge. — Length 675 ft.
4. Between Rilska bridge and Gorna Dzhumaya. — (2 tunnels) one 537 ft. long and the other 405 ft. long.

4. (Sofiya)/Vrba/Gyueshevo
22 tunnels. Longest 1,335 ft.
9 tunnels, 13 to 650 ft. long, and 5 tunnels 650 to 1,335 ft. long, between Radomir and Kyustendil.
8 tunnels between Kyustendil and Gyueshevo.

5. Ilientsi/Makotsevo
No tunnels.

6. Mezdra/Lom
No tunnels.

7. Brusartsi/Vidin
2 tunnels. Total length 1,350 ft., longest 850 ft.

8. Yasen/Somovit/Nikopol
No data.

9. Levski/Svishtov
No tunnels.

10. Levski/Lovech
No tunnels.

11. Zimnitsa/Dubovo/Sopot
At least 1 tunnel about 1,500 ft. long under Strazhata watershed (E. of Kalofer).

*Line number on Figure VII - 2.
†Tunnel number on Figure VII - 2.

TABLE VII - 38 (*Continued*)

12. Plovdiv/Burgaz	
No tunnels.	
13. Krichim/Peshtera	
No tunnels.	
14. Krumovo/Asenovgrad	
No data.	
15. Rakovski/Momchilgrad	
3 tunnels. Total length 4,900 ft., longest 3,670 ft.	
5. Between Knizhovnik and Perperek at Most stop.	Length 3,670 ft. Longest tunnel in Balkan Peninsula.
16. Mikhailovo/Rakovski	
1 tunnel.	
6. Brest/Mariino tunnel. S entrance 1 mi. NE of Mariino station, 1⅛ mi. N of Maritsa River bridge.	Length 731 ft.
17. Ruse/Stara-Zagora	
2 tunnels on Ruse/Trnovo section.	
6 tunnels on Trnovo/Plachkovtsi section.	
11 tunnels on Plachkovtsi/Borushtitsa section.	
5 tunnels on Borushtitsa/Dubovo section.	
—	
24 tunnels	
7. 2 tunnels under town of Trnovo.	Length of longest is 535 ft.
8. Between Trnovo and Debelets.	Length 900 ft.
9. Between Drenovo and Tsareva Livada.	Length over 650 ft.
10. Between Plachkovtsi and Krustets.	Length 2,400 ft.
11. Between Plachkovtsi and Krustets. (Illustration VII - 13.)	Length 2,000 ft.
12. Between Raduntsi and Yavrovets.	Length 1,935 ft.
18. Shumen/Karnobat	
3 tunnels, 240, 230 and 80 m.	
19. Ruse/Varna	
No tunnels.	
20. Iovkovo/Oborishte	
No works of importance.	

(5) ***Peshtera/Batak eight kilometers (five miles), Line 505.*** This line will be a continuation of line 13.

(6) ***Asenovgrad/Ustovo 81 kilometers (50 miles), Line 506.*** This line will be a continuation of the north-south route, Ruse/Asenovgrad (lines 15, 16, 17).

(7) ***Isperikh/Frontier/Silistra, Rumania, eight kilometers (five miles), Line 507.*** (Topic I. (10) above.)

(8) ***Burgaz/Elkhovo/Gulubovo 161 kilometers (100 miles), Line 508.*** A connection is projected between Burgaz and the Tundzha/Elkhovo (line 114) and Nova Zagora/Zlati-dol lines.

77. *Roads*

A. General characteristics.

By comparison with other European countries the network of roads in Bulgaria is sparse. The average density of roads is .19 kilometer per square kilometer (.3 mile per square mile) by comparison with .62 kilometer per square kilometer (.97 mile per square mile) in Italy and 1.1 kilometers per square kilometer (1.75 miles per square mile) in France. In contrast to these countries, where two or three good routes commonly link important towns, few main roads in Bulgaria have alternates. The total length of roads in Bulgaria is approximately 24,500 kilometers (15,225 miles).

The present condition as well as the construction of Bulgarian roads varies greatly; in general their standards are far lower than in western Europe. At the end of 1938, 50 per cent of the roads were officially stated to be in good condition, which is interpreted to mean passable at an average speed of 30–40 kilometers per hour (20–25 miles per hour); the other 50 per cent were adjudged fair or bad, probably not allowing speeds above 20 kilometers per hour (12 miles per hour).

Extensive repairs and new construction have been carried out by the Bulgarian Government (with German assistance since 1941) and the quality of the road net has probably improved considerably.

B. Natural conditions along roads.

(1) ***Adaptation of roads to terrain.*** In general terms Bulgaria consists of two plain areas and two mountain areas trending in a general east-west direction across the country. On the north is a rolling plain area, in places level, elsewhere hilly, known as the Danubian Tablelands. In the approximate center of the country are the Stara-Planina (Balkan Mountains); south of these are the Maritsa and associated valleys. The southern and western border of the country is composed largely of the Rodopi Planina (Rhodope Mountains).*

These alternating plain and mountain regions give Bulgaria great diversity of relief, and are so cut off from one another that communication between them is difficult.

Although Sofiya is not centrally located, its position in relation to the natural routes connecting these regions makes it the focal point of the national road system. (Plan VII - 2.) To the northwest, a road from Sofiya through Dragoman Pass leads across the frontier to Niš on the Thessaloníki/Beograd Highway. Directly north a road leads through Prokhod Petrokhanski (Petrohan Pass) to Lom on the Danubian border of the Danubian Tablelands. To the east, a road from Sofiya runs through a series of east-west valleys

*In this chapter the term Rodopi Planina (Rhodope Mountains) is applied to all the ranges of southwestern Bulgaria, including the Rodopi, Rila, Pirin, Vitosha, and the western frontier ranges.

lying between the Stara-Planina and the Sredna Gora (Anti-Balkans) to Burgaz on the Black Sea. From the Sofiya/Burgaz road a number of roads branch off to passes through the Stara-Planina and run north to Orekhovo (Orchovo), they break up into three parallel chains, and though lower are much wider. The Stara-Planina constitute a formidable barrier between northwestern Bulgaria and Yugoslavia as well as between the Danubian Tablelands and the Maritsa

Illustration VII - 23. Minor road near Trnovo.
Road leads from railroad station to village in valley.

Pleven, Ruse, and Shumen in the Danubian Tablelands. To the southeast, a major route through the Maritsa Valley connects Sofiya with Plovdiv and Kharmanli and with Edirne in Turkey. To the south a road from Sofiya through the Dzherman-Struma Valley in the Rodopi Planina provides the most direct connection with Sérrai, in Greece. At Pernik, Dupnitsa, Gorna Dzhumaya and Petrich roads branch from the Sofiya/Sérrai route and lead across the frontier to various points on the Thessaloníki/Beograd Highway.

(*a*) *Danubian Tablelands.* Most of the roads in the Danubian Tablelands run north and south. From the marshy banks of the Danube, the Danubian Tablelands rise abruptly in steep cliffs, and then rise gradually to the south, where they merge with the northern slopes of the Stara-Planina. Tributaries of the Danube have cut deep winding trenches in the surface of this undulating region. With few exceptions north-south roads avoid these deep trenches and stay on the uplands, descending only to serve the towns which are located in the valleys. (Illustration VII - 23.) East-west travel is difficult. The Danube Valley floor is extremely marshy and subject to flooding, and is crossed by only one important road, from Lom to Vidin. Thirty to 40 kilometers (19 to 25 miles) south of the Danube, where the valleys become broader and lower, east-west roads connect towns and settlements in the central portions of the Danubian Tablelands.

(*b*) *Stara-Planina.* The Stara-Planina form the southern border of the Danubian Tablelands. In the west their trend is southeast. East of Sofiya their course is directly east to the Black Sea, where they terminate at Cape Emine. They are highest in their western and central portions. East of Sliven Valley, the most important agricultural regions in Bulgaria. In the northwestern corner of Bulgaria two passes, one of which is less than 1,000 feet in elevation, lead through the Stara-Planina to Yugoslavia. Four passes connect the western Danubian Tablelands and the Sofiya Basin. East of Sofiya a number of passes connect the Danubian Tablelands and the Black Sea area north and west of Burgaz with the east-west valleys south of the Stara-Planina. (Illustration VII - 24.) The principal passes are given in Table VII - 39.

TABLE VII - 39
BULGARIA, PASSES CONNECTING DANUBIAN TABLELANDS AND BLACK SEA AREA WITH STARA-PLANINA

ROUTE	PASS	ALTITUDE
Vidin/Negotin, Yug.	near Bregovo	236 m. (774 ft.)
Vidin/Zaječar, Yug.	Vrshka-Chuka	400 m. (1,312 ft.)
Lom/Niš, Yug.	Sveti Nikola	1,441 m. (4,738 ft.)
Sofiya/Lom	Petrokhan	1,438 m. (4,718 ft.)
Sofiya/Vrattsa	Iskr Gorge	510 m. (1,673 ft.)
Sofiya/Botevgrad	Churek	ca. 1,000 m. (3,280 ft.)
Sofiya/Botevgrad	Arabakonak	952 m. (3,123 ft.)
Zlatitza/Lukovit	Etropole	1,350 m. (4,429 ft.)
Karlovo/Lovech	Troyan	1,515 m. (5,003 ft.)
Kazanlk/Gorna Orekhovitsa	Shipka	1,333 m. (4,373 ft.)
Tvrditsa/Elena	Tvrditsa	1,092 m. (3,583 ft.)
Sliven/Elena	Zheleznávrata	1,097 m. (3,606 ft.)
Sliven/Omortag	Kotel	865 m. (2,838 ft.)
Straldzha/Shumen	Vrbitsa	824 m. (2,703 ft.)
Karnobat/Shumen	Karnobat	ca. 600 m. (1,968 ft.)
Burgaz/Varna	Dermen-Dere	419 m. (1,375 ft.)

Illustration VII - 24. Shipka pass through the Stara-Planina.
Looking east. Kazanlk/Trnovo road in foreground. (Page VII - 55.)

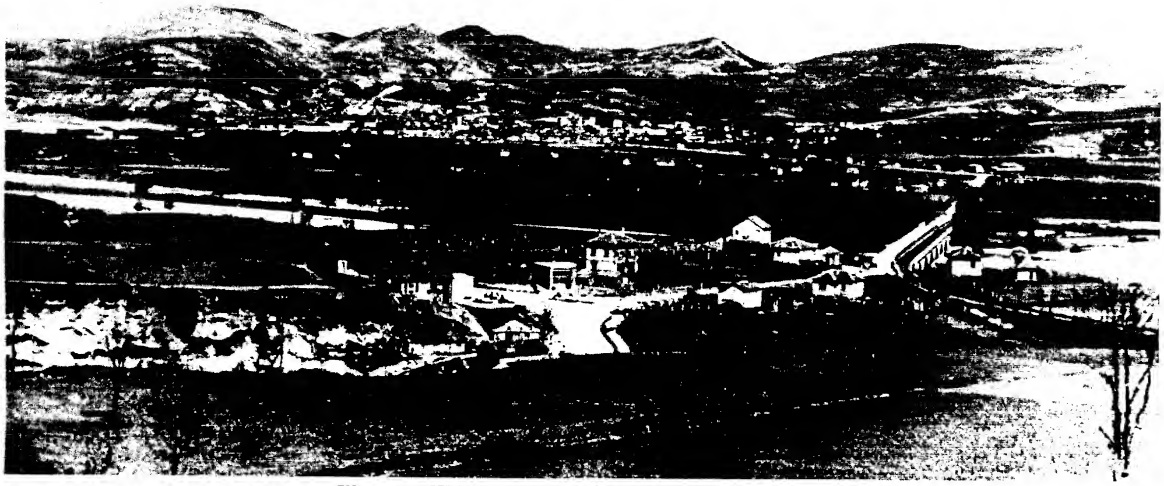


Illustration VII - 25. Khaskovo/Komotiní, Greece, Road.
Looking north toward Krdzhali. Road and railroad bridge over Arda River.
Rodopi Planina in distance. (*Illustration VII - 6.*)

(*c*) *The Maritsa and associated valleys.* The Maritsa drainage system is divided into two east-west valley routes separated by the Sredna Gora (Anti-Balkan Mountains), a low range of mountains along the southern flank of the Stara-Planina.

The more northerly of these two routes is composed of the Sofiya Basin and a series of longitudinal valleys, generally termed the Sub-Balkan Valley, providing a natural route from Sofiya to Burgaz on the Black Sea. These valleys, however, do not provide a continuous valley route, since low divides must be crossed from one valley to another. On the west some steep grades mark the passage from Sofiya to the Sarantsi Basin, and from the latter to the Zlatitza Valley. eastward, these valleys are separated by low ridges, and passage over them is never more than moderately difficult. Passage south across the Sredna Gora (Anti-Balkans) is provided by several low passes; roads branch southward at Pirdop (Pirdol), Karlovo, Kazanlk, Gurkovo, and Sliven, and lead into the Maritsa Valley proper. From Burgaz two roads cross hilly country to Strandzha and Malko Trnovo on the Turkish frontier.

The Maritsa Valley proper is a broad plain bordered on the north by the Sredna Gora and on the south and west by the Rodopi Planina. (Illustration VII - 25.) The western por-

Illustration VII - 26. Sofiya/Sérrai road.
Above Petrich in the Struma Valley. Looking south.

tion of the valley is relatively flat and has more roads than the eastern part, which is hilly. From Sofiya the principal road runs through the western spurs of the Sredna Gora following the Maritsa River, and connects in turn Banya Kostenets, Pazardzhik, Plovdiv, and Kharmanli. Each of these towns is the focal point of routes south to the Rodopi Planina and north to the Danubian Tablelands. From Plovdiv and Kharmanli two roads converge on Stara-Zagora, continuing as a single route to Sliven and Burgaz. From Kharmanli the main road from Sofiya continues to Svilengrad and from there to Edirne in Turkey. East of the Tundzha River, the terrain is increasingly rugged, and the road net is sparse; only one major road, the Svilengrad/Burgaz route, crosses the area.

(*d*) *Rodopi Planina.* The Rodopi Planina, which lie southwest of the Sofiya/Plovdiv/Edirne Highway, form a rugged mass. Few natural routes lead through the Rodopi Planina and road construction is consequently difficult and expensive. From Sofiya, a road following the Dzherman/Struma Valley runs to Sérrai in Greece and the Aegean Sea through a series of narrow river plains separated by gorges. (Illustration VII - 26.) From the Sofiya/Sérrai route a number of roads branch off to the west, leading into Yugoslavia. Originating at Dupnitsa, a branch road to Kumanovo runs through the Kyustendil Valley and crosses the frontier *via* the Devebair Pass. Farther south two less important roads branch off at Gorna Dzhumaya and Kriva-Livada, and by way of difficult passes lead into Yugoslavia, one running to Carevo-Selo and the other to Strumica. Finally, near the Greek frontier, a road from the Sofiya/Sérrai route follows the Strumitsa Valley into Yugoslavia. East of the Struma Valley there are few good north-south roads in the Rodopi Planina. Two routes to the Aegean, the Sofiya/Dráma and Plovdiv/Xánthi roads, are confined to winding mountain valleys. Adequate east-west roads are also lacking. From Dupnitsa on the west the best of these follows the Klisura Valley east to Samokov, and from there crosses over a low pass leading to Banya Kostenets in the Maritsa Valley.

(2) *Climate and weather.* The annual precipitation in Bulgaria ranges between 20 and 30 inches. The heaviest rainfall occurs in May and June, and, combined with melting snows from the mountains, gives rise to serious floods in the lowland areas. The Danube and the lower courses of the rivers in the Danubian Tablelands inundate large areas. The soils in valleys of the Danubian Tablelands are fine-textured and probably very sticky when wet. The soils in the upland surface of the Danubian Tablelands are quite porous, drain rapidly, and should be passable most of the time. Roads in the Sofiya Basin, in the eastern portion of the Tundzha Valley, and along the banks of the Maritsa River are subject to flooding, and travel over them may be disrupted in spring and early summer. The area south of the Stara-Planina is very dry in late summer, producing extremely dusty roads. Since the sub-soil of the road beds is usually dry before freezing, heaving of road beds during spring is probably at a minimum.

The snowfall in the Danubian Tablelands is moderate, and of relatively short duration. Strong winds blowing from the northeast may build drifts of sufficient depth to block the roads in the upland surface. Valleys in the Danubian Tablelands are protected, and the snow cover seldom persists more than 30 days.

Many passes in the Stara-Planina are closed by heavy falls of snow. Reports indicate that roads through passes at 460 meters (1,500 feet) and lower are usually open throughout the winter. The Vidin/Negotin route into Yugoslavia is open, while the Vidin/Zaječar and Lom/Niš routes are blocked from December through February. It is probable that the new road from Sofiya through the Iskr Gorge to Vrattsa was built to provide a route free from snow blockade. Other routes running north from Sofiya employ passes over 900 meters (2,950 feet) in altitude. East of Sofiya, principal roads through passes in the Stara-Planina are blocked intermittently from December through February. According to all reports, bus lines in this area are able to maintain fairly regular schedules in winter.

The snow cover in the Maritsa Valley is of short duration and does not hinder communications.

The heaviest snows in Bulgaria occur in the Rodopi Planina. Nevertheless, the route from Sofiya through Kyustendil to Kumanovo in Yugoslavia can be used throughout the year. The northern portion of the Sofiya/Sérrai route may be blocked intermittently during December and January. Other roads through the Rodopi Planina may be impassable for considerably longer periods of time. Snow in the high passes lingers far into the summer months.

(3) *Terrain adjacent to roads.*

(*a*) *Cover.* Cover suitable for concealing motor transport varies considerably from region to region. Though 28 per cent of the area of Bulgaria is classed as forest land, most of it lies in the Stara-Planina and the Rodopi highlands, where the terrain prevents deployment. It is probable that the rate of cutting has increased since the war, and that forests near good roads have been heavily depleted.

The Danubian Tablelands are practically treeless. Cover along roads through this area is limited to village streets and to thickets bordering streams. Toward the eastern portion of the Danubian Tablelands roads from Shumen and Razgrad into Rumania have good cover in the Deli-orman Forest. Along the coast of the Black Sea the Longoz and Genish-Ada forests afford good cover for roads converging upon Varna.

Roads crossing the Stara-Planina run through much wooded country (beech and oak). The northern slopes are more heavily forested than the southern, but the northern slopes are probably accessible at only a few points. Most of the favorable slopes in these mountains have long been deforested and are used for grazing.

In the valleys and basins south of the Stara-Planina and north of the Sredna Gora there are few extensive areas of woodland. Roads in the Sofiya Basin have very little protective cover. In the Zlatitza, Karlovo, and Kazanlk Valleys favorable terrain provides easy access to scattered groves of walnut and fruit trees, which may effectively conceal small units. In the Tvrditsa and Sliven Valleys, which lie farther east, cover is very sparse, being limited to isolated patches of oaks. In the western and central portions of the Sredna Gora, which form the southern border of these valleys, there are many well-wooded areas. Large groves of beech trees alternate with pasture land and provide good but discontinuous cover. Access to cover is usually good.

In the Maritsa Valley proper, most of the land is in cultivation. Willow and aspen grow along the main stream banks and may screen movements, but offer little concealment from the air. In the Plovdiv and Stara-Zagora areas orchards and

walnut groves provide limited, discontinuous concealment. East of Plovdiv small oak woods, and patches of scrub growth may conceal small units. Between the Tundzha Valley and the Black Sea wooded hills provide fair cover for the roads leading from Burgaz and Yambol into Turkey. Access to cover diminishes toward the frontier, where the terrain is rugged and, in places, mountainous.

The Rodopi Planina are clothed with dense forests. Access to cover from the road is usually difficult, and dependent upon local terrain. Orchards in the small valleys and mountain basins drained by the Struma may be reached from the roadside.

(b) Deployment. Conditions for deployment in Bulgaria range from fair to good in the Danubian Tablelands and the there are limited areas favorable for deployment in valleys leading to the Black Sea.

In the basins and valleys south of the Stara-Planina the terrain is favorable for deployment and some cross-country movement. In the Sofiya Basin movement from the road is hindered by perennial marshes. In addition, the network of tributaries which joins the Iskr near Sofiya floods large areas during the spring months. The terrain in the Zlatitza, Karlovo, Kazanlk, Tvrditsa, and Sliven Valleys is generally favorable for deployment. Movement from the road is rather poor in the hilly areas which separate these valleys from one another. In the eastern end of the Sliven Valley, the Azmak River is bordered by large marshy tracts.

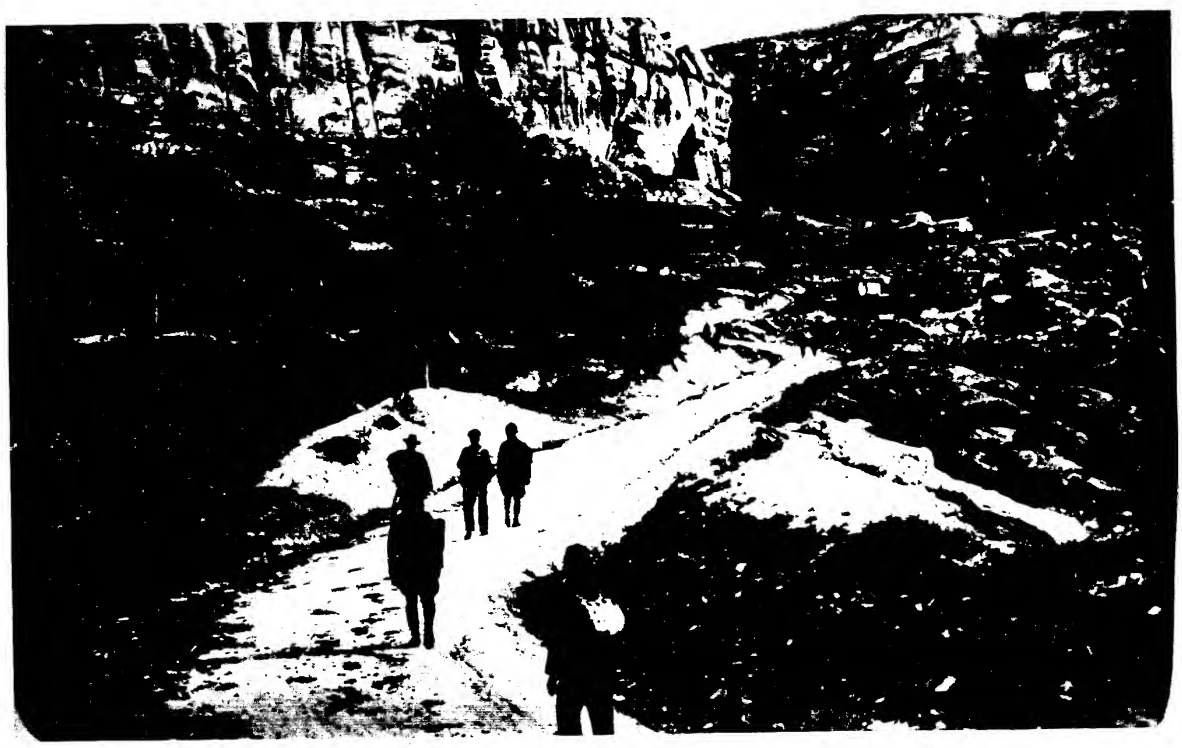


Illustration VII - 27. Minor road near Madara.
Sixteen kilometers (ten miles) east of Shumen.

Maritsa Valley. Elsewhere they are poor. Movement across country for any considerable distance is uncertain and difficult.

In the Danubian Tablelands conditions for deployment are usually good. On the rolling upland surface, movement from the roadside is possible in most of the area. Cross-country movement from point to point is quite uncertain, and likely to be interrupted by deep, steeply walled valleys. Deployment from valley roads is limited by the marshy areas which border the lower courses of the streams. The banks of the Danube are also marshy, and can be traversed with safety only when frozen. Toward the east, the hilly area bordering the Rumanian frontier and the Black Sea is unfavorable for cross-country movement, but probably suitable for short-range deployment.

Deployment is usually impossible from roads leading through the Stara-Planina. East of Sliven, where the Stara-Planina are lower and divide into several parallel ranges,

Roads leading through the Sredna Gora and connecting these east-west valleys with the Maritsa Plain employ low passes, whose approaches have moderate slopes. Deployment in the pass areas is restricted, especially on the road leading from Kazanlk to Stara-Zagora.

In the Maritsa Valley, much of the terrain is suitable for deployment. The network of roads serving this agricultural region is of moderate density, and could be used during dry weather for cross-country movement. The banks of the Maritsa, as well as the lower courses of its confluents, are marshy and difficult of access. Large, irrigated rice fields also border the river banks. East of the Tundzha River, roads to the Black Sea area cross rugged hilly land. Near the Turkish frontier hills become mountainous and seriously hinder deployment.

In the Rodopi Planina deployment is extremely limited

and local in character, and cross-country movement is virtually impossible. Subsidiary routes are few, and, where they exist, are little better than trails or cart tracks. Only in the small basins and valleys is movement from the roadside feasible. Southwest of Sofiya the route to Kyustendil runs through the plains of Pernik, Radomir, and Kyustendil. Movement across these lowlands is usually free, though the Radomir Plain is marshy and subject to floods in spring and early summer. South of Sofiya, the road following the Dzherman and Struma Rivers into Greece is confined for the most part to narrow, and at places gorge-like, valleys. East of the Struma Valley and south of the Maritsa Valley roads through the Rodopi Planina wind through ravines and gorges.

C. Administration.

It is reported that about half of the Bulgarian roads are owned by the state. Included are military roads and roads connecting the important towns, railroad stations, and ports. The state classifies these roads according to width, curves, and grades (Topic 77 - D, *Standards of Construction and Quality*). The administration of state roads is a function of the Ministry of Public Works, Roads and Plans, a department of which is devoted to roads and bridges. Maintenance stations located along state roads are established and supervised by the Ministry. Minor roads (Illustration VII - 27), communicating with principal roads and connecting villages of little importance, are generally administered by local authorities.

D. Standards of construction and quality.

(1) ***Surface and roadbed.*** According to official statements, Bulgarian roads are predominately waterbound macadam, with only a few kilometers of other types of surfaces. The surface and length of the roads is shown in Table VII - 40.

TABLE VII - 40
BULGARIA, SURFACE AND LENGTH OF ROADS

	1938		1939		1940	
	KM.	MI.	KM.	MI.	KM.	MI.
Waterbound macadam	18,813	11,690	19,141	11,894	20,000	12,427
Granite block	240	149	337	209	500	311
Cement concrete	28	17	53	33	80	50
Bituminous concrete	15	9	11	7	11	7
Block brick	2	1.2	2	1.2	2	1.2
Total	19,098	11,866.2	19,544	12,144.2	20,593	12,796.2

Figures for 1940 are estimated, since surface statistics were withheld by the government. Although no figures exist on other types of surface, it is reported that local roads are likely to be unmetalled; some have improved earth or sand-clay surfaces.

The waterbound macadam roads consist of a base of broken stone, laid by hand, covered with a layer of crushed limestone or sand, and finished with road rollers. Frequently little attention is given the rolling process and some roads are consequently poorly compacted.

Stone-block paving, an endurable surface that can be built with local materials and little mechanical equipment, has increased in popularity in recent years. This type of surface is found especially around Sofiya and in other districts where granite is abundant (Table VII - 45).*

*Tables 44 and 45 will be found on pages 59 and 60.

Maintenance of road surface varies considerably among individual roads; as a rule, however, it is poor. Poor drainage is a common defect, due both to construction and maintenance as well as to weather and soil conditions. Government regulations require ditches along every road. These together with numerous culverts are expected to provide adequate drainage. Nevertheless traffic is hindered even on the best roads because the surface becomes spongy and rough during the rainy season.

Since 1941 the Bulgarian Government, with the aid of German engineers, has improved considerably the quality of selected principal roads. Road connections between Bulgaria and newly acquired territories have been improved and widened; attention has been paid roads to the Dobrogea (Dobruja), to Greece, and to Yugoslavia, and according to one account these roads will now accommodate 30-ton tanks. In March 1943 the Todt organization undertook to build 1,200 kilometers (745 miles) of bituminous surfaced roads for the Bulgarian Government. As far as is known, however, construction was never begun.

(2) ***Width of road and shoulders.*** Surfaced roads are officially divided into four classes, distinguished according to grades and curves, but primarily according to width. The various classes of roads are expected to have the widths given in Table VII - 41.

TABLE VII - 41
BULGARIA, CLASSES AND WIDTHS OF ROADS

CLASS	WIDTH					
	SURFACED PART		BETWEEN DITCHES		INCLUDING DITCHES	
	M.	FT.	M.	FT.	M.	FT.
Main	6.0	19.7	9.0	29.5	12.0	39.4
First	5.0	16.4	8.0	26.2	11.0	36.1
Second	4.0	13.1	7.0	23.0	10.0	32.8
Third	4.0	13.1	6-7.0	19.7-23.0	8.4	28.0

In 1939 only 9,000 kilometers (approximately 5,600 miles) of roads were listed as first class or better and consequently had roadways at least five meters (16.4 feet) wide. The strict accuracy of these figures may be questioned; they are probably somewhat too conservative. However, it is clear that a large proportion of Bulgarian roads are very narrow. Principal highways through rugged terrain, as well as minor roads generally, are suitable for only one-way traffic with occasional passing. Since 1941 many principal highways have been widened and improved for military purposes.

Shoulders on each side of the road are supposed to be approximately 1.5 meters (4.9 feet) wide. Where the terrain permits this rule is adhered to, but in the mountains and through numerous defiles, shoulders are likely to be either very narrow or entirely lacking.

(3) ***Grades and curves.*** According to government specifications, grades and curves on the various classes of roads must meet the requirements given in Table VII - 42.

TABLE VII - 42
BULGARIA, ROAD REQUIREMENTS

CLASS OF ROAD	MAXIMUM GRADES (PER CENT)	MINIMUM RADIUS OF CURVES		MINIMUM DISTANCE BETWEEN CURVES	
		M.	FT.	M.	FT.
Main	6	50	164.0	30	98.4
First	6	50	164.0	30	98.4
Second	7	30	98.4	20	65.6
Third	7	20	65.6	20	65.6

Few roads, regardless of class, come up to the standards for maximum grades. The ruling grade on the principal routes to Greece, Yugoslavia, and through the Balkans is commonly ten to 20 per cent. Construction of mountain roads is largely controlled by terrain; switchbacks and serpentine routes fail to conform to government specifications for the lowest class road.

(4) *Bridges.* Almost every road in Bulgaria crosses several streams and the total number of bridges and culverts is rather large. In 1939 there were 8,299 bridges and 34,283 culverts. amount of road traffic. On slightly travelled mountain roads the width between parapets must be 3.6 meters (11.8 feet); width of the roadway on the bridge must be three meters (9.8 feet). On roads of medium or heavy traffic consisting of carts, motor cars, agricultural machinery, or light trucks, width between parapets must be five meters (16.4 feet); width of roadway 4.4 meters (14.4 feet). On roads of heavy traffic consisting of heavy trucks, carts, automobiles, or agricultural machinery, width between parapets must be 5.6 meters (18.4 feet) and five meters (16.4 feet) on the roadway. In spite of the low quality of existing bridges, they probably are not a

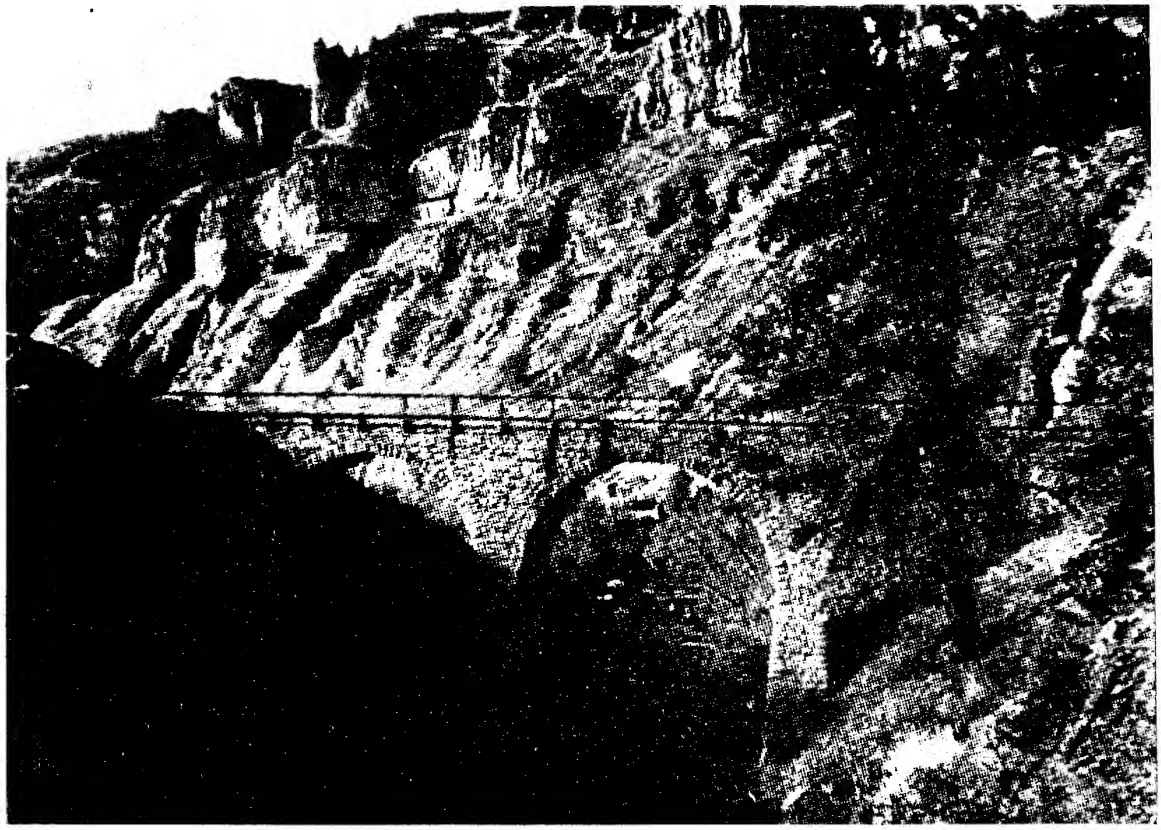


Illustration VII - 28. Bridge in Iskr Gorge.
Connects Lakatnik on the railroad to Sofiya with minor road on west bank of Iskr River.

According to official statistics, new construction of bridges proceeded steadily before the war. In 1937, 2,541 new bridges and culverts were built, 3,620 in 1938, and 2,390 in 1939 (Tables VII - 44 and VII - 45).

Although some very poor bridges have been replaced, the quality of bridges generally is poor. Their load capacities are particularly low, and many cannot bear loads of five tons. The width of bridges is regulated by the government. The specifications, which are probably observed in practice in new construction, are exceedingly unpretentious. Bridges with a single arch two meters (6.6 feet) or less in length must be as wide as the road. These are classed as culverts. The width of bridges with an arch over two meters (6.6 feet) in length or with more than one arch is to vary according to the crucial factor in the road system. Mountain bridges are reported to be so short that they can be braced to bear most military loads. (Illustration VII - 28.) Many streams along valley floors are shallow with gravel beds, and in the dry season are easily forded by motor transport.

Although the rate of building throughout Bulgaria has doubtless dropped since the war began, German engineers and forced-labor battalions have speeded bridge building as well as surface improvements on strategic roads. In many parts of the country existing bridges are reported to have been strengthened under German direction. On the roads to Greece, particularly the Sofiya/Sérrai route, bridges are reported to be repaired. Bridge repairs are also said to have been made on the road from Sofiya to Kazanlk and on roads south of Ruse.

E. Maintenance.

In 1939 Bulgaria had 628 road maintenance stations, divided among the administrative regions as follows: Burgaz, 54; Vrattsa, 90; Plovdiv, 94; Pleven, 86; Sofiya, 99; Stara-Zagora, 69; Shumen, 136. Stations were added steadily in the years before the war, 43 in 1937, 60 in 1938, and 26 in 1939. The location of the stations is unknown.

As of January 1941, there were 350 gasoline or steam rollers in Bulgaria, 25 stone crushers, 11 boring machines, 10 tractor graders, 100 motor trucks, and 1 mechanical sprinkling machine. However, most work of maintenance is done by hand. Road material generally comes from the vicinity of the road to be built. Stone quarries, gravel, and sand are reported to be abundant, and the relatively small amount of cement used in road construction is of domestic manufacture.

Since the war, construction and repair gangs have been organized from forced labor. A report of May 1942 stated that 95 separate detachments had been formed. These contained approximately 5,000 men working in all parts of Bulgaria.

F. Traffic density and use of roads.

No statistics on the density of traffic in Bulgaria exist. The value of such statistics for estimating Bulgarian road capacity is doubtful, since motor traffic is very light and the capacity of a road is normally never reached. On rural roads much of the local traffic is carried in animal-drawn vehicles and few automobiles are seen.

The Bulgarian population has generally considered maintenance of automobiles for private affairs a luxury, and a rather large proportion of registered vehicles are engaged in hauling passengers or freight for hire. (Illustration VII - 29.)

The Bulgarian Automobile Administration, under the Ministry of Public Works, has exercised control over all highway transport lines. In 1939 the state operated 1,200 trucks, which transported 90 million ton-kilometers (62 million ton-miles) of freight. In the same year private companies carried 80 million ton-kilometers (55 million ton-miles). Two hundred fifteen bus lines with a total length of 10,000 kilometers (approximately 6,200 miles) are reported to have carried 6,700,000 passengers in 1939, about half the number carried by the state railroads. Since that time bus lines have been cancelled where they duplicated service by railroad. While service is mostly on urban or local lines, several long-distance lines exist. Sofiya is the focus of lines to Skoplje, Petrich, Thessaloníki, Nevrokop, Razlog, Vrattsa, Samokov, Karlovo, and Kazanlk. Other bus lines reported are Burgaz/Varna and Trnovo/Sevlievo/Troyan.

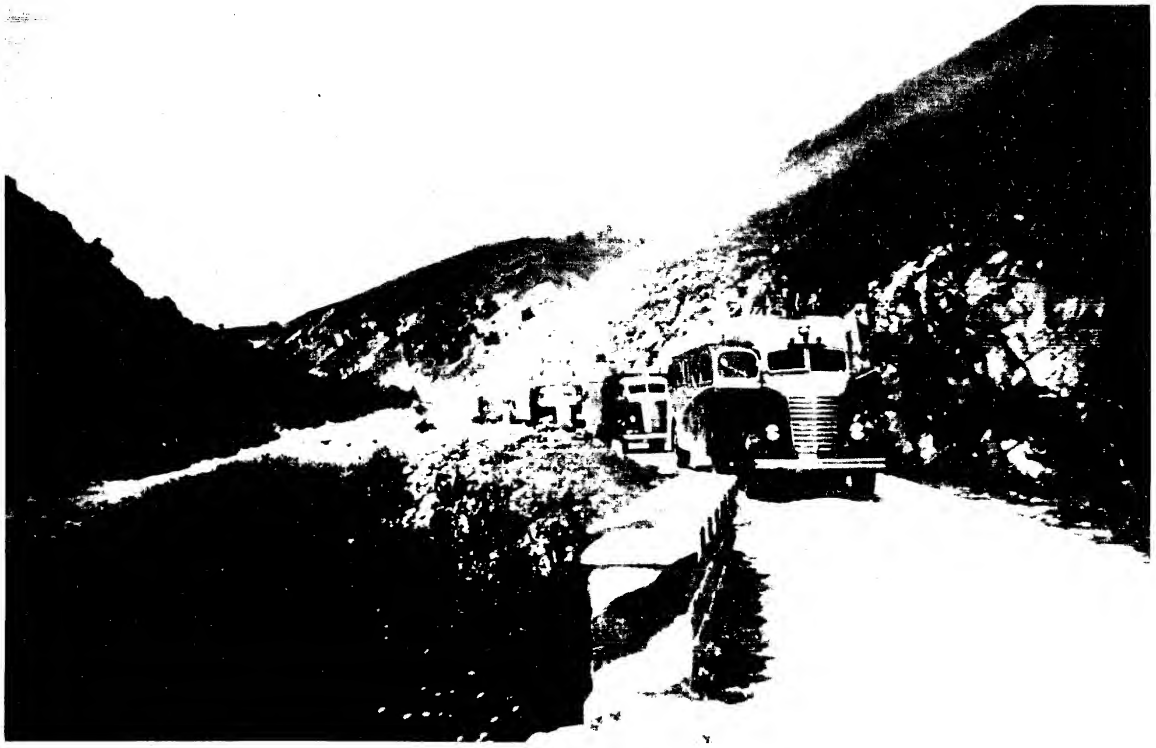


Illustration VII - 29. Truck caravan.
Road in the mountains of southern Bulgaria.

G. Vehicles.

Although the number of automobiles in Bulgaria, especially trucks and buses, showed a steady increase immediately before the war, the total number remains inconsiderable. With an average of 9.7 automobiles for every 10,000 persons, Bulgaria has the smallest number of cars, in relation to population, in the Balkans.

TABLE VII - 43
BULGARIA, NUMBER OF MOTOR VEHICLES

AUTOMOBILES	1936	1937	1938	1939
Passenger	2,105	2,478	2,503	3,030
Buses	410	542	587	753
Trucks	709	1,091	1,616	2,316
Total	3,224	4,111	4,706	6,099

Many passenger automobiles are old models of American manufacture, while newer cars are mostly German and Italian. Approximately 400 of the listed passenger cars are taxicabs. An unknown proportion of converted passenger cars are used as buses and are included in the bus figures. Of the total number of trucks, 231 are reported to be Diesel powered. In 1939, in addition to the vehicles listed, there were 3,272 motorcycles.

Late reports, while incomplete, suggest that the number of vehicles in Bulgaria has increased somewhat since 1939; a few trucks have been imported, probably for military purposes. Nevertheless, fewer vehicles are in use due largely to shortage of fuel, and, according to one report (1943), 300 buses are idle.

There is no recent general information on repair facilities or personnel. However, it is known that the Germans undertook large-scale construction of truck garages in Stara-Zagora and Plovdiv in 1941.

Although the exact percentage is not known, a large proportion of road traffic is carried by animal-drawn vehicles. Many rural roads, particularly in the mountains, are reported to be impassable except by wagon. The commonest type of such vehicles consists of small four-wheeled wagons, some of which carry loads up to 1,200 pounds. These are drawn by horses, oxen, or water buffalo. Another common vehicle is the two-wheeled country cart, drawn by a single horse, and capable of carrying loads up to 700 pounds.

H. Description of main roads.

(1) *Sofiya/Plovdiv.*

(a) *Log.*

	KM.	MI.
Sofiya	0.0	0.0
Vakarel	38.0	23.6
Ikhtiman	56.0	34.8
Banya Kostenets	78.0	48.5
Belovo	96.0	59.7
Pazardzhik	134.0	83.3
Plovdiv	171.0	106.3

This road is a part of the direct route between Caribrod, Yugoslavia, and Edirne, Turkey. From Sofiya to Pazardzhik the surface consists of granite blocks; from Pazardzhik to Plovdiv it is concrete (1943). It is reported to be a three- to four-lane highway (1943). An alternate route from Sofiya to Banya Kostenets runs south along the Iskr River via Samokov. While the latter is in good condition, it covers more difficult terrain. When the Maritsa is in flood the Pazardzhik/Plovdiv section is in danger of interruption. There are few very sharp curves on the road as a whole, but some are found between Banya Kostenets and Belovo. Grades of 10–20 per cent are found northwest of Vakarel, and lesser grades (up to 10 per cent) in the vicinity of Ikhtiman.

(*b*) *Route.* The road leaves Sofiya and follows the river terrace. A more difficult alternate route to Plovdiv, via Samokov, branches south at kilometers seven (miles 4.3). About one-half kilometer (0.3 mile) further on, the road leads down into Iskr Plain and crosses the Golem Iskr River. The road continues, ascending gently with very few curves, to Novi Khan, altitude 621 meters (2,037 feet). East of Novi Khan the road crosses a steep-sided ravine and intersects the railroad three times within 2.5 kilometers (1.6 miles), climbing the steep slopes of the Ikhtiman Range. At an elevation of

Illustration VII - 30. Bridge over Maritsa River.
Road into Plovdiv. Looking south.

about 860 meters (2,822 feet) the road runs on an almost level course to Vakarelski Hanove (Vakarel Station), then downgrade, paralleling the railroad through a precipitous narrow gorge 2.5 kilometers (1.6 miles) long. Beyond the gorge, the road proceeds over undulating terrain to Ikhtiman. The road to Banya Kostenets and Pazardzhik crosses the Maritsa River twice, continues fairly straight and level through the Maritsa Valley rice and tobacco fields and grazing land to Plovdiv.

(*c*) *Notes.* Important bridges and viaducts are located at Vakarel, near Ikhtiman, north of Banya Kostenets, west of Pazardzhik, and in western Plovdiv. The Vakarel viaduct, located 31 kilometers (19 miles) from Sofiya, is of masonry construction, 129.8 meters (426 feet) long, seven meters (23 feet) wide, and 30.5–39.6 meters (100–130 feet) high. The viaduct at Ikhtiman crossing a minor stream at an altitude of about 305 meters (100 feet), constitutes a vulnerable point on the road. The Pazardzhik and Plovdiv bridges are iron, about 50 meters (164 feet) and 50–75 meters (164–246 feet) long respectively. (Illustration VII - 30.) Of the important bridges on this road, seven are stone, six concrete, two iron, one wooden, and one of unspecified material.

The Maritsa River in the Pazardzhik/Plovdiv area is very shallow, with a firm sand and gravel bed. It can be forded at Plovdiv when not in flood; average width of the stream is 100–300 meters (328.1–984.3 feet). Banks are likely to be marshy in places.

(2) *Plovdiv/Edirne, Turkey.*

(*a*) *Log.*

	Km.	Mi.
Plovdiv	0.0	0.0
Khaskovo	77.0	47.8
Kharmanli	111.0	69.0
Svilengrad	145.0	90.1
Edirne	177.0	110.0

This road forms part of the Caribrod, Yugoslavia/Edirne, Turkey route. Average width is six to eight meters (19.7–26.2 feet); type of surface not known but is probably water-bound macadam. In late 1942 work on this road was still in progress. Floods endanger sections of it every spring. Curves are few, and there are no serious grades.

(*b*) *Route.* Road runs close to Maritsa River through rice fields (marshy during flood time) to Popovitsa, kilometers 26 (miles 16.2). There it swings away from river, and crossing numerous streams hugs the lower slopes of Rodopi Planina to Khaskovo, then follows Olu Dere Valley to Kharmanli. From Kharmanli to Edirne the road follows the Maritsa River, crossing to the right bank at Svilengrad.

(*c*) *Notes.* Important bridges are located at Plovdiv, Kharmanli, and Svilengrad, where the road crosses the Maritsa. Two other bridges are reported between Plovdiv and Kharmanli.

(3) *Sofiya/Lom.*

(*a*) *Log.*

	Km.	Mi.
Sofiya	0.0	0.0
Petrokhan	56.0	34.8
Berkovitsa	79.0	49.1
Ferdinand	104.0	64.6
St. Tserovene	129.0	80.2
Lom	159.0	98.8

This is a good macadam road, with an average width of six meters (19.7 feet). It is very winding and steep between Kostinbrod and Berkovitsa. In winter, sections are often made impassable by snow and rain; between Berkovitsa and Lom, stretches of road are subject to floods.

(*b*) *Route.* The road crosses Sofiya Plain to Kostinbrod, kilometers 12 (miles 7.5). Beyond Kostinbrod, it climbs the barren slopes of the Stara-Planina, crossing Iskrets (Iskret) Valley. The road then rises in a series of hairpin curves and long grades (up to 20 per cent) to Petrokhan Pass, altitude 1,438 meters (4,718 feet). Leaving Petrokhan, it descends in steep hairpin curves through wooded terrain to Klisura village. The road follows the Klisura River through Berkovitsa to Ferdinand, after crossing the Danube Plateau. Three kilometers (two miles) south of Lom, the road drops abruptly into Lom Valley, crossing the river before entering town.

(*c*) *Notes.* An important bridge crosses the Tsibr River south of St. Tserovene. Nine principal bridges are reported (1942) between Sofiya and Lom: two stone, one wooden, three iron (one of six spans, one of three, one unspecified), one iron and concrete, and one unspecified.

(4) *Sofiya/Vrattsa.* A new road through Iskr Gorge provides a direct route from Sofiya via Kurilo and Svoge to Vrattsa. Until recently only the railroad and a rough wagon track followed this course. The new road was reported complete at the end of 1942. (According to a conflicting account, it was still under costruction at that time.) Jewish labor battalions were reportedly employed.

The exact itinerary of the new road is unknown. It was probably built to provide a route free of snow blockades from Sofiya north through the Stara-Planina.

(5) *Sofiya/Varna.*

(*a*) *Log.*

	Km.	Mi.
Sofiya	0.0	0.0
Botevgrad	60.0	37.3
Lovech	166.0	103.1
Trnovo	250.0	155.3
Omortag	324.0	201.3
Trgovishte	346.0	215.0
Shumen	385.0	239.2
Varna	476.0	295.8

This road is one of the two principal highways between Sofiya and Black Sea. The roadbed is metalled and has been repaired and widened to an average of six meters (19.7 feet), but is dusty and rough in places. Bridges in the Sofiya/Botevgrad section have been improved to take loads of 15 tons (1942). The road crosses moderately hilly country most of its way, with very few steep grades and sharp curves. The Lovech/Trnovo section is difficult in wet weather.

(*b*) *Route.* Sofiya/Lovech. From Sofiya the road starts east across the plain, turns north at kilometers 20 (miles 12.4), then leads over a 1,000-meter (3,281-foot) pass to Botevgrad, altitude 331 meters (1,086 feet), via Churek. An alternate route continues east through Sarantsi and Arabakonak Pass. Between Churek and Botevgrad the road is winding in places and steep. East of Botevgrad the road leaves the mountains, passes through a twisting gorge and, crossing Mlk. Iskr River, climbs rapidly to Yablanitsa, situated beyond a low ridge, altitude 429 meters (1,407 feet). Descending, it crosses Vit River, cutting through hills to Blgarski-izvor (Turski Isvor), kilometers 126 (miles 78.3). Leaving Blgarski-izvor, the road follows a fairly level course to Mikre, then climbs

steep grades (up to ten per cent) over a low divide to Lovech, kilometers 166 (miles 103.1).

Lovech/Trnovo. This road crosses two undulating, partly wooded plateaus which extend between the Osm River, crossed by road at Lovech and the Rositsa River, crossed at Sevlievo, and the Yantra River, crossed at Trnovo. Altitudes vary from about 500 meters to 200 meters (1,640–656 feet).

Trnovo/Shumen. Leaving Trnovo (Illustration VII - 31), this road crosses Yantra and runs through cultivated land cut by numerous streams to cross Karadere. Thence the road

(6) Sofiya/Burgaz.

(a) Log.

	Km.	Mi.
Sofiya	0.0	0.0
Pirdop	80.0	49.7
Karlovo	148.0	92.0
Kazanlk	201.0	124.9
Stara-Zagora	235.0	146.0
Sliven	304.0	188.9
Aitos	384.0	238.6
Burgaz	415.0	257.9

Illustration VII - 31. Asenova, a suburb of Trnovo.
The Trnovo/Shumen road enters village in right foreground, crosses Yantra River over bridge in center, and climbs to plateau surface. Looking east.

rises through hilly country to Omortag. Continuing through woods to Prolaz, altitude 472 meters (1,548 feet), the road then descends through a narrow gorge and winds through hills to Trgovishte. From Trgovishte to Shumen, it crosses undulating partially wooded country, and crosses the Varna and a number of other streams and rivers.

Shumen/Varna. This road passes over hilly country, and crosses a great many streams. It winds over hills, most of them low and partially cultivated. One steep hill occurs 20–25 kilometers (12.4–15.5 miles) east of Vetreno (10–20 per cent grades). From Shumen to Vetreno, the road crosses several rivers.

This road, running from Sofiya to the Black Sea between Stara-Planina to the north and the low Sredna Gora chain to the south, is the southernmost of the two principal east-west highways of Bulgaria. It is metalled, 6 meters wide (19.7 feet). Since German occupation, it has been subject to heavy military traffic. Although reported to be in excellent condition (1942) it is likely to be rough and dusty. In 1940 the Aitos/Burgaz section was in bad condition except for eight kilometers (five miles) of stone paving outside Burgaz; it has since been classified as a first-class motor road (October 1942). German engineers have strengthened bridges in the Sofiya/Kazanlk section (1942). While a few steep grades and

bad curves occur between Sofiya and Kazanlk, the road as a whole is not difficult. From Sofiya to Burgaz the road parallels the railroad, and crosses it at frequent intervals.

(*b*) *Route.* Sofiya/Karlovo. The terrain is rough, and the road crosses two water divides which are quite steep and are in danger of washouts in the rainy season. From Sofiya the road runs over the bare Sofiya Plain, crossing the Golem Iskr River at kilometers eight (miles five) outside Vrazhdebna. Around kilometers 25 (miles 15.5) it climbs rapidly to Sarantsi Basin, and reaches Sarantsi village (kilometers 35, miles 21.7) after crossing the Vominska River three times. Beyond Sarantsi village the road passes through Sarantsi Gorge, a very narrow passage between steep walls. From kilometers 42 (miles 26.1) the road climbs over Gulubets divide (Zlatitza ridge), altitude 900 meters (2,953 feet), and then descends into Zlatitza Basin, altitude 700 meters (2,297 feet), running on to Pirdop (kilometers 85, miles 52.8), on northeastern edge of basin. (Branch roads run north to Lukovit and south to Pazardzhik.) A few kilometers beyond Pirdop, the road crosses the hillside above the north bank of the Topolnitsa River, many streams and some marshy land. At kilometers 102 (miles 63.4) the road crosses a low pass at Kosnitsa, then descends steeply to Klisura defile, two to three kilometers (0.5–1.5 miles) long, a deep and narrow part of Strema Valley. Here the road crosses the Strema River near the entrance and then follows the valley to Karlovo.

Karlovo/Stara-Zagora. This road runs through the Valley of Roses, the rolling Tundzha Valley, and over the Surnena Gora. From Karlovo the road winds along mountain slopes, crossing many streams and some marshy ground, down through the upper part of Tundzha Valley to Kazanlk. (Branch roads run north to Gabrovo, and east to Sliven.) From Kazanlk the road continues down Tundzha Valley for 18 kilometers (11.2 miles), crosses the river, and begins ascent of Sredna Gora Range. The altitude near the summit is 469 meters (1,539 feet). The road then descends Sredna Gora along a small wooded valley to Stara-Zagora.

Stara-Zagora/Sliven. From Stara-Zagora roads branch southwest to Plovdiv, south to Kharmanli, and north to Kazanlk and Sliven. The road from Stara-Zagora enters vineyard country and continues along a plain southeast of Sredna Gora Range crossing several small streams. From Popovo, kilometers 273 (miles 169.6), the road climbs the eastern spurs of Sredna Gora. There are no steep grades, the altitude being not over 250 meters (820 feet). At Staro Selo the road descends into Tundzha Valley, crosses the Tundzha and an affluent, then continues fairly level through Chairli to Sliven.

Sliven/Burgaz. Roads branch from Sliven north to Trnovo, west to Kazanlk and to Stara-Zagora, and south to Yambol. From Sliven to Burgaz the road runs at an average elevation of about 100 meters (328 feet). It crosses the Azmak Dere (River) five to seven kilometers (8–11 miles) west of Karnobat, rising from that point to the summit of a low divide. From there the road drops gradually into the rolling plain extending to Burgaz.

(*c*) *Notes.* The following bridges are important: over the Tundzha west of Sliven; over the Azmak west of Karnobat; over the Aitoska west of Aitos.

As far east as Yambol the Tundzha has an average width of 46 meters (150 feet) and a depth of one to two meters (three to seven feet). The banks are generally low and in dry weather the river can be forded by carts in many places.

(7) *Varna/Burgaz.*

(*a*) *Log.*

	Km.	Mi.
Varna	0.0	0.0
Vetreno	45.0	28.0
Provadiya	61.0	37.9
Aitos	134.0	83.3
Burgaz	165.0	102.5

This is the principal road between Bulgaria's two Black Sea ports. There are numerous steep grades. The road is in good condition, with average width of at least six meters (20 feet) (1942). The surface is probably macadam except for a few kilometers outside of Burgaz and Varna where it is paved with stone (1942).

(*b*) *Route.* The route follows the Sofiya/Varna road to Vetreno. From Vetreno the road climbs over a rise to descend into Provadiska Valley, and crosses the river a few kilometers north of Provadiya to enter the town. From Provadiya the road descends into Ana-Dere Valley, then climbs over another divide into Golema-Kamchiya Valley, and from there into Luda Kamchiya Valley. After following the Alma-Dere (River) for a few kilometers, the road ascends to the Dermen-Dere Pass, altitude 419 meters (1,375 feet), crossing it via the spectacular Bogaz-Dere defile and enters Aitos. From Aitos to Burgaz the route follows the Sofiya/Burgaz road.

(*c*) *Notes.* A shorter alternate route along the coast, via St. Orekhovo, has been widened and improved recently (1942). (Illustration VII - 32.) In latest reports (March 1943) it is classed as a second-class motor road. It passes through boggy ground south of the Kamchiya River. Between kilometers 43 and 58 (miles 26.7–36.0) there is an unmetalled strip of road which is impassable in wet weather; the rest is metalled (1942).

An important bridge on the alternate coast route is over the canal south of Varna. This bridge is of new, metal construction, 64 meters (210 feet) long, 11.6 meters (38 feet) wide; it lifts by electric power, creating an 18.3 meter (60 feet) clearance for ships.

(8) *Ruse/Trnovo.*

(*a*) *Log.*

	Km.	Mi.
Ruse	0.0	0.0
Bela	51.0	31.7
Trnovo	102.0	63.4

Part of the road from Ruse on the northern frontier to Edirne, Turkey, is metalled and said to be in good condition (October 1942). (Illustration VII - 33.) The average width is six meters (19.7 feet). The bridges have been repaired by the Germans (1941). The road lies through fairly easy terrain and has very few steep grades.

(*b*) *Route.* After crossing the Lom River five kilometers (3.1 miles) southwest of Ruse, the road ascends a plateau leading to Bela, altitude 310 meters (1,017 feet). Leaving Bela, it enters Yantra Valley, which it follows to the Rositsa River. Seven kilometers (four miles) south of Bela, the road to Pleven branches west. Crossing the Rositsa River, the road passes over a low divide to Polikraishte, then descends and re-enters Yantra Valley which is a narrow defile at this point. Here the road follows up the west bank of the Yantra River to Trnovo and enters the city by means of a high single-span bridge.

(*c*) *Notes.* Road through Yantra defile, a section six to eight kilometers (3.7–5 miles) long north of Trnovo, can be

Illustration VII - 32. Varna/Burgaz road near Barakli.
Roadway cut through rock in eastern spur of Balkan Mountains. Road is narrow, and is alternate route to Varna (via Aitos) Burgaz road.

Illustration VII - 33. Pontoon bridge over the Danube River.
Connects Ruse with Giurgiu in Rumania.

avoided by going from Polikraishte via Gorna Orekhovitsa (Gln.-Orekhovitza, Gorna Orehovitsa).

(9) Trnovo/Kazanlk.

(a) Log.

	Km.	Mi.
Trnovo	0.0	0.0
Drenovo	22.0	13.7
Gabrovo	42.0	26.1
Kazanlk	76.0	47.2

The surface is six meters (19.7 feet) wide at an average, metalled and in good condition (October 1942). Between Gabrovo and Kazanlk the road is very winding and steep. Some grades are as steep as 20 per cent. Snow makes this section extremely difficult to travel and occasionally impassable from December to March 1. Bridges and viaducts are numerous, and, because of the nature of the terrain, constitute vulnerable points.

(b) Route. About 3.2 kilometers (two miles) south of Trnovo the road crosses the Yantra River, following a fairly level course to Debelets village. Crossing the Belitsa River, the road runs to the Drenovo River, which it follows closely. There are several railroad grade crossings to Drenovo, whence the road continues to Gabrovo on the Yantra. Here a branch road runs to Sevlievo. The main road crosses the Yantra, following Yantra Valley for six to eight kilometers (3.7–5 miles). Upon leaving the valley, the road is extremely steep and winding to Shipka Pass, altitude 1,333 meters (4,364 feet) (Illustration VII - 24). The road then winds down the ridge (hairpin curves, 10–20 per cent grades) to Shipka village, altitude 548 meters (1,798 feet), descending from there into the rolling Tundzha Valley, then through bushes and trees to Kazanlk.

(10) Vidin/Negotin, Yugoslavia.

(a) Log.

	Km.	Mi.
Vidin	0.0	0.0
Smrdan	6.0	3.7
Gmzovo	17.0	10.6
Bregovo	29.0	18.0
Negotin	43.0	26.7

This road is one of the three most travelled routes from Bulgaria to Yugoslavia. From Negotin in Yugoslavia a road leads to Zaječar (Zaichar) and Cuprija on Niš/Beograd highway. A secondary road leads northward from Negotin to Tekija on the Danube, where there is reportedly a ferry connection to Orşovo in Rumania.

(b) Route. From Vidin the road crosses the Topolovitsa River and a stream near Smrdan, and runs through rolling terrain and vineyards. At kilometers 26 (miles 16.2) the road is winding with grades up to ten per cent, then leads through a low spur of Stara-Planina, altitude 236 meters (774 feet) to Gmzovo and thence to Bregovo, crossing the Timok River to Yugoslavia. Here the road turns northeast, skirting the foothills to Negotin.

(c) Notes. There is no recent information on construction details. The road can handle two-way traffic, and has a waterbound macadam surface.

Deployment is possible from most points along the road within Bulgaria. There is some marshy terrain on the outskirts of Vidin. Deployment would be limited near Gmzovo, and cover poor.

The only suitable alternate route is the Vidin/Zaječar road via Prokhod Vrshka-chuka (Vrachka-Chuka or Vrushka Chuka Pass), altitude 400 meters (1,312 feet). This pass is subject to snow blocking and the road through it is poorly developed.

(11) Vidin/Zaječar, Yugoslavia.

(a) Log.

	Km.	Mi.
Vidin	0.0	0.0
Voinitsa (Voinitza)	16.0	9.9
Kula	32.0	19.9
Vrshka-chuka Pass	44.0	27.3
Zaječar	54.0	33.6

This road is a possible alternate for the Vidin/Negotin route. The distance from Vidin to the Niš/Beograd Highway is 50 kilometers (31 miles) shorter via Zaječar than via Negotin, but the Negotin road crosses less difficult terrain and is probably better surfaced.

(b) Route. Out of Vidin the road crosses marshy land, then gradually ascends a plateau to Kula, altitude 229 meters (981 feet). Here the road leaves the treeless area at Kula and ascends the lower slopes of Vrshka-chuka Mountain. It passes through the low gorge of Topolovitsa River to Vrshka-chuka Pass, altitude 400 meters (1,312 feet), on the Yugoslav frontier. The descent westward into Timok Valley is steep with grades up to ten per cent. Timok River is crossed at kilometers 53 (miles 33).

(c) Notes. There are two major bridges: one over the Topolovitsa at Vidin; the other over the Timok at Zaječar.

The road is probably in poor condition as no recent construction or improvements have been reported.

Deployment from the road is possible between Vidin and Kula. Movement is restricted between Kula and Zaječar. The pass is likely to be blocked by snow from November to March.

(12) Sofiya/Caribrod, Yugoslavia.

(a) Log.

	Km.	Mi.
Sofiya	0.0	0.0
Slivnitsa	27.0	16.8
Dragoman	41.0	25.5
Frontier	53.0	33.0
Caribrod	59.0	36.7

This is the principal road between Bulgaria and Yugoslavia, and an important link in the international highway connecting Istanbul, Sofiya, and Beograd.

(b) Route. From Sofiya the road runs over an open plain to Slivnitsa; from there it crosses a branch of the Iskr and enters a barren hilly region. From kilometers 36 (miles 22.7) it climbs steadily (grades up to ten per cent) to Dragoman Pass, altitude 726 meters (2,382 feet). After a short descent for about eight kilometers (five miles) the road again climbs with grades up to ten per cent, then descends into the wild Nišava (Nisava) Valley, which it follows into Caribrod.

(c) Notes. The average width is six meters (19.7 feet), and type of surface varies. Some of the road is stone-set pavement, probably in the vicinity of Sofiya. The remainder is macadam, most of which is waterbound, and some portions are said to be asphalt surfaced. Reports indicate that extensive repairs are in progress (1943). Possibilities of deployment from the road are good to Dragoman Pass. The lowland area immediately west of Sofiya is subject to flooding from March to June. Cover is sparse, consisting in the main of scattered scrub-oak, which offers poor concealment.

Existing bridges have been strengthened and are reported to be capable of carrying military loads.

(13) Dupnitsa/Kriva Palanka, Yugoslavia.

(a) Log.

	Km.	Mi.
Dupnitsa	0.0	0.0
Kyustendil	31.0	19.3
Gyueshevo	52.0	32.3
Devebair Pass	55.0	34.2
Kriva Palanka	68.0	42.3

This is the route from the middle Struma Valley to Yugoslavia. From Dupnitsa good roads lead eastward to Plovdiv and northward to Sofiya. From Kyustendil a good road leads to Radomir and Sofiya. Beyond Kriva Palanka, the road leads west to Kumanovo in the Vardar Valley.

(b) Route. The road, leaving Dupnitsa, crosses the Dzherman River and winds through hills to the Struma River. The bridge is at kilometers 30 (miles 18.6). The road then follows a tributary of the Struma through low, wooded hills to Kyustendil, thence through rugged terrain crossing numerous mountain streams to Gyueshevo. A steep ascent leads to Devebair Pass, altitude 1,191 meters (3,907 feet). The descent is by way of a deep gorge through heavily wooded mountains to Kriva Palanka.

(c) Notes. The road is reported widened and improved to accommodate two-way traffic and heavy axle loads (1941). Much forced labor was reportedly employed (May 1942). It was still under construction with most bridges unfinished in October 1942. It has a metalled surface, which is kept in good condition (March 1943).

Devebair Pass is probably blocked by snow during December and January.

(14) Gornu Dzhumaya/Carevo-Selo, Yugoslavia.

(a) Log.

	Km.	Mi.
Gorna Dzhumaya	0.0	0.0
Klisura	17.0	10.6
Frontier	24.0	14.9
Carevo-Selo	40.0	24.9

This is a difficult route over Lukov Vrkh in the Vlakhina (Vlahina) Mountains; an alternate to the Dupnitsa/Kriva Palanka route (*13*).

(b) Route. The road crosses the Struma River at kilometers 5 (miles 3.1), and then leads through undulating terrain to Klisura Valley. A steep ascent from Klisura Valley climbs to the pass over Lukov (Vrkh Peak), altitude 1,297 meters (4,255 feet). The road then descends through rough mountainous terrain to Carevo-Selo.

(c) Notes. The road is one-way only. Its surface is waterbound macadam, with some unmetalled stretches. It was reported to be in poor condition after use by military traffic (1941), but repairs were under way in 1942.

Bridges are located at kilometers five, seven and eight (miles 3.1, 4.3, 5.0).

(15) Levunovo (Deltchevo)/Strumica, Yugoslavia.

(a) Log.

	Km.	Mi.
Levunovo	0.0	0.0
Petrich	14.0	8.7
Frontier	38.0	23.6
Strumica	68.0	42.5

This is the southernmost of roads from Bulgaria to Yugoslavia. With a maximum altitude of 259 meters (850 feet) it is not subject to snow blockade. It branches from the Sofiya/Sérrai route in the Struma Valley, leading westward by way of Strumitsa Valley to Strumica, where it joins the Vardar Valley road from Skoplje to Thessaloníki.

(b) Route. The road runs southwest from Levunovo crossing the Struma at kilometer one (mile 0.6) and the Strumitsa River at kilometers six (miles 3.7). It approaches Petrich across the floodplain of the Strumitsa. Leaving Petrich the road again crosses the Strumitsa at kilometers 16 (miles 9.9), continuing westward along the left bank. The road runs through orchard country (terrain of moderate relief), staying within one or two kilometers (0.6–1.2 miles) of the stream bed. At kilometers 60 (miles 37.3) the road crosses a bridge over the Strumitsa, where it is joined by a road from the northeast, originating at Kriva-Livada. At kilometers 66 (miles 41) the road crosses a bridge over a tributary of the Strumitsa, entering the town of Strumica two kilometers (1.2 miles) beyond.

(c) Notes. This road is reportedly one-way throughout (May 1943), with metalled surface varying in quality from fair to poor (April 1943).

(16) Sofiya/Sérrai, Greece.

(a) Log.

	Km.	Mi.
Sofiya	0.0	0.0
Tsrkva	22.0	13.7
Dupnitsa	64.0	40.0
Gorna Dzhumaya	99.0	61.5
Kriva-Livada	142.0	88.2
Levunovo	174.0	108.1
Marino-pole	180.0	111.5
Kulata	185.0	115.0
Sérrai	227.0	141.1

This is the principal road (Struma Valley route) from Sofiya to Greece. A fair but somewhat longer alternate road connects Sofiya, Samokov, Razlog, and Sérrai. Several roads lead from the Sofiya/Sérrai road to Yugoslavia.

(b) Route. From Sofiya the road follows a fairly straight course to Tsrkva. There are many grade crossings over the railroad. (Illustration VII - 34.) From Tsrkva (Tzrkva) the road leads up the narrow Struma Valley to Krapets kilometers 32 (miles 19.9). It then leaves the valley and climbs (ten per cent grades) over a water divide (altitude ca. 1,200 meters, 3,937 feet) to the headwaters of the Dzherman River. The road follows the right bank of the Dzherman River along the steep valley wall, while the railroad runs south on the opposite side. The valley widens at Dupnitsa, where the road crosses to the left bank, above the railroad. The road winds in and out of the sparsely wooded lower slopes of the Rila Planina, staying well above the valley floor. At Slatina, kilometers 78 (miles 48.5), the road enters the main valley of the Struma, pursuing a very winding, undulating course high above the valley plain, which is subject to flooding. From Gorna Dzhumaya to kilometers 110 (miles 68.4) the route is less winding. At the latter point, the road and railroad cross the river and follow wooded Kresna Gorge to Kriva-Livada. (Illustration VII - 35.) Some of the grades are ten per cent. At Kriva-Livada the road crosses to the left bank of the Struma, following the slopes of the Pirin Planina above the railroad and the marshy plain as far as Kulata (where the railroad formerly terminated). South of Kulata

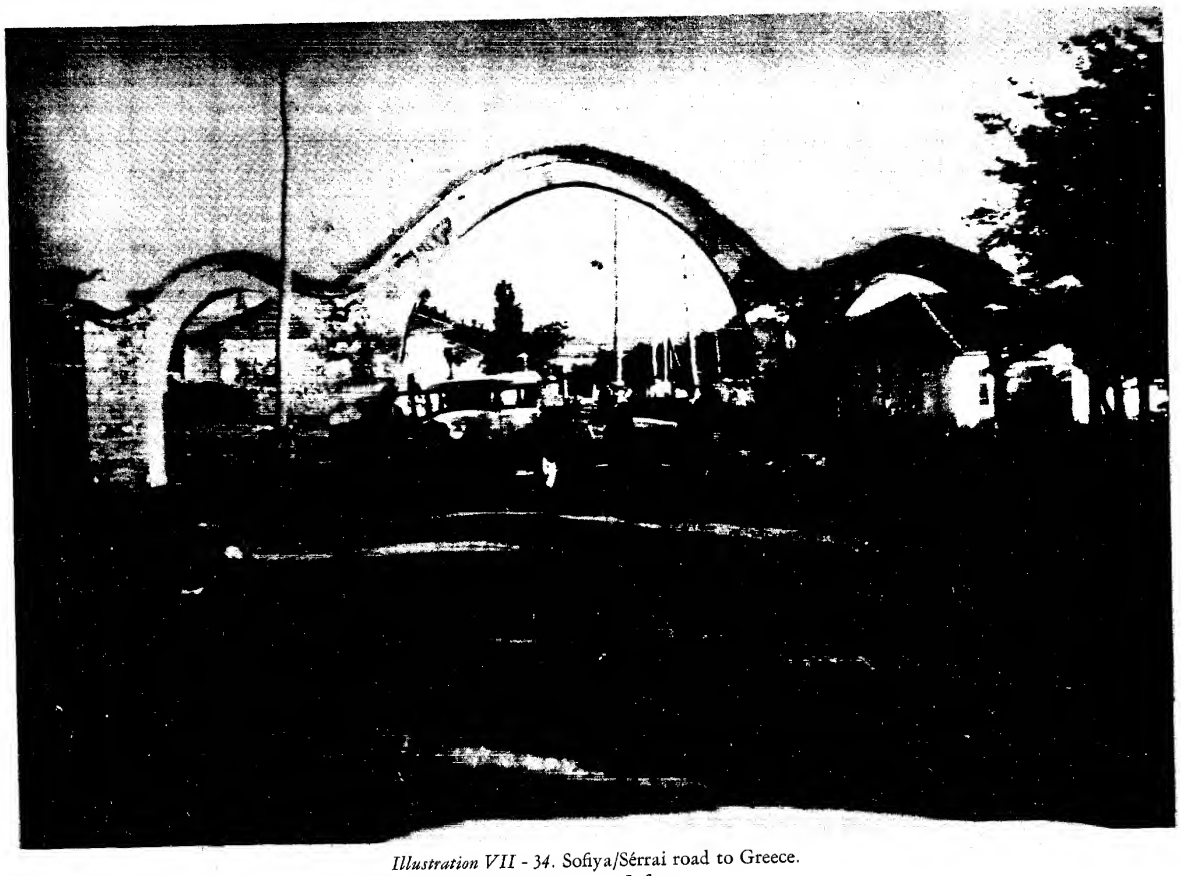


Illustration VII - 34. Sofiya/Sérrai road to Greece.
Route 16, near Sofiya.

the road runs through Rupel Gorge (length ca. 15 kilometers, 9.3 miles) to Sidhirókastron (Siderokastron). The road continues over undulating cultivated terrain on the east side of a broad marshy floodplain to Sérrai.

(*c*) *Notes.* The average width of the road is seven meters (23 feet); it narrows to a single-lane road in Kresna Gorge. Grades up to ten per cent occur between Dupnitsa and Tsrkva and in Kresna Gorge north of Kriva-Livada.

The type and quality of the surface vary: from Sofiya to Tsrkva it is granite block paving; from Tsrkva to Kulata, waterbound macadam; from the Greek frontier to Sérrai, tarmac.

The stretch from Gorna Dzhumaya to Levunovo is reportedly incapable of withstanding heavy motor transport in bad weather. A recent report states the road is kept in good condition (March 1943).

There are about 18 major bridges between Sofiya and Kulata. The type of construction varies, but almost all bridges are of stone, concrete, or steel. Since 1940, bridges formerly capable of supporting only five-ton loads have been strengthened to take ten tons, or have been replaced. North of Kriva-Livada two stone bridges, one over the Struma and the other over a tributary, are particularly vulnerable since they lead into the Kresna Gorge, a portion of the route that has no alternate. Small wooden culverts and a 15 meter (49.2 feet) wooden bridge south of Levunovo are reported to have been strengthened.

(17) *Sofiya/Dráma, Greece.*

(*a*) *Log.*

	Km.	Mi.
Sofiya	0.0	0.0
Samokov	57.0	35.4
Banya Kostenets	86.0	53.4
Belovo	104.0	64.6
Bansko	172.0	106.9
Nevrokop	221.0	137.3
Frontier	246.0	152.9
Dráma	296.0	183.9

This road is the more difficult of two routes from Sofiya into Greece. Most of it runs over mountains or through very rough country. Its surface is concrete or stone-set as far as Samokov, and macadam in fair to good condition beyond (1942). Its average width is six meters (19.7 feet) (seven meters as far as Samokov). Bridges and culverts are numerous.

(*b*) *Route.* The road to Samokov follows the Iskr River closely, sometimes running in the river valley, and sometimes on the hills above. Leaving Samokov, it crosses a divide, altitude 1,045 meters (3,429 feet) to Banya Kostenets, then proceeds along the Maritsa River for 18 kilometers (11.2 miles) to the Belovo turn-off. The road runs from there to Bansko, rising to elevations of over 1,000 meters (3,281 feet), then drops into the Mesta Valley. Leaving Bansko, the road runs along the Mesta River to Nevrokop, when it swings away from the Mesta and continues over rough country to the frontier.

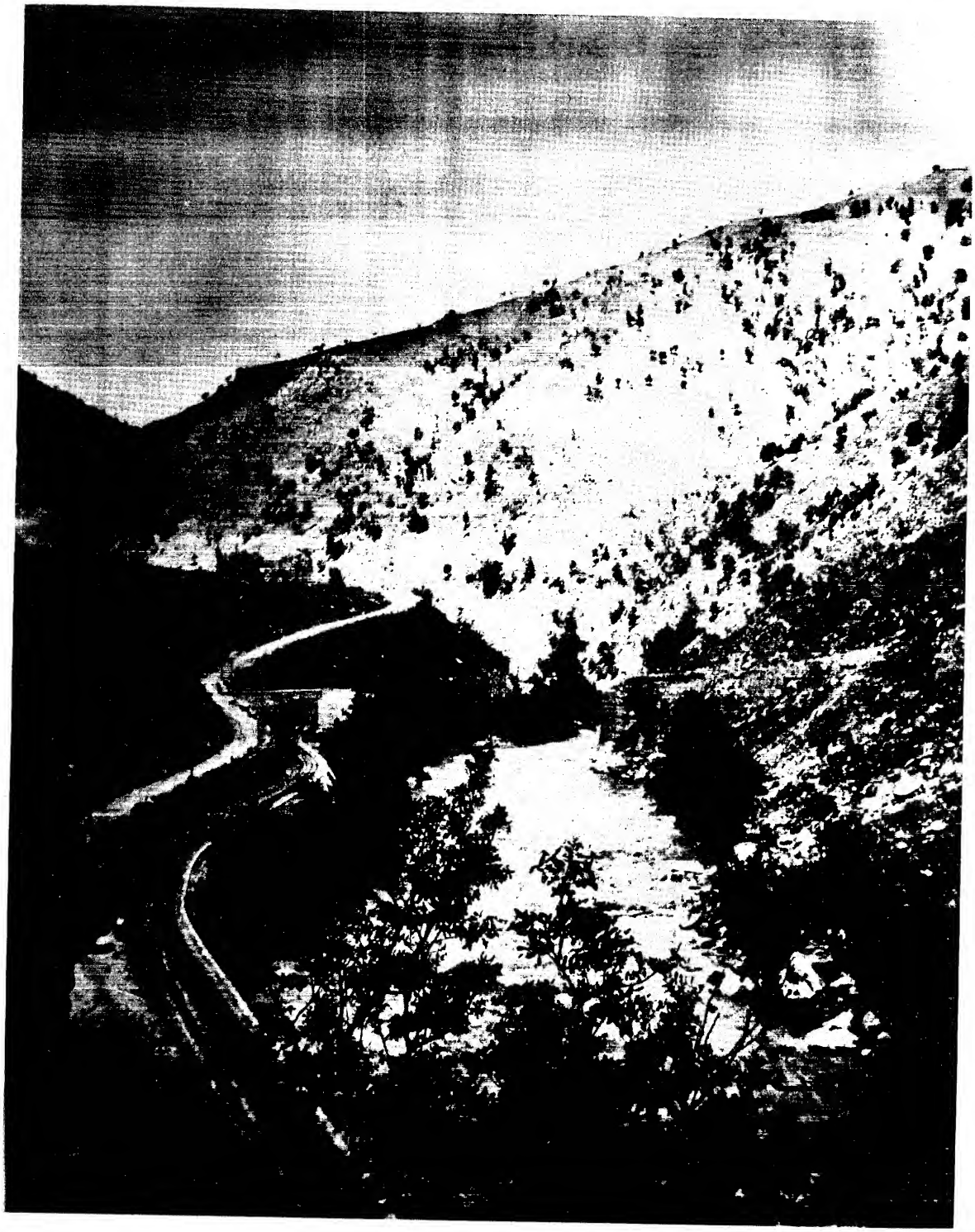


Illustration VII - 35. Sofiya/Sérrai road.
Looking north into the Kresna Gorge in the Struma Valley north of Petrich.

(*c*) *Notes.* From Sofiya to Samokov there are 13 bridges, one of wood and 12 of concrete or iron, and 25 culverts; from Samokov to Bansko there are at least 8 wooden culverts and about 6 wooden bridges.

A more direct route between Sofiya and Bansko runs by Belitsa. It is a very difficult mountain road, apparently in poor condition.

(18) *Plovdiv/Xánthi, Greece.*

(*a*) *Log.*

	Km.	Mi.
Plovdiv	0.0	0.0
Asenovgrad	20.0	12.5
Raikovo	87.0	54.1
Frontier	112.0	70.0
Xánthi	164.0	102.0

Used extensively by the military, this road has recently been widened to an average width of six meters (19.7 feet) as far as the frontier. It is a mountain road with numerous deep defiles, hairpin curves, and steep grades. In some narrow valleys, the road is subject to floods. Its surface is macadam as far as Asenovgrad; laid with stone blocks between Asenovgrad and Raikovo, beyond which the surface was under repair in 1942 and is believed to be in good condition at present.

(*b*) *Route.* From Plovdiv to Asenovgrad the road follows a level and fairly straight course across the cultivated Maritsa Plain. At Asenovgrad it crosses an important bridge over the Stanimashka River, following the river valley to Chepelare. The road is steepest over Bukova Range, beginning south of Chepelare. It ascends in a series of long grades (10–20 per cent) through Raikovo to a pass, altitude 1,198 meters (3,931 feet). The descent is equally steep as far as the Arda River. After crossing the river, the road again rises to Eledja Pass, altitude 1,061 meters (3,481 feet). It then crosses the frontier into Greece.

(19) *Khaskovo/Komotiní, Greece.*

(*a*) *Log.*

	Km.	Mi.
Khaskovo	0.0	0.0
Krdzhali	42.0	26.1
Momchilgrad	58.0	36.1
Komotiní	116.0	72.1

This is the best route across the Rodopi Planina east of the Sofiya/Sérrai road.

(*b*) *Route.* Branching from the Edirne/Plovdiv road at Khaskovo, the road cuts across low ridges (no altitudes over about 650 meters, 2,133 feet) to Krdzhali. It then enters Syuyutliika Valley and, passing through Momchilgrad, proceeds along the valley for 18–20 kilometers (11.2–12.4 miles). At this point the road encounters steep grades (10–20 per cent) which continue as far as Makaz Pass, altitude 707 meters (2,320 feet), into Greece.

(*c*) *Notes.* The road is two-way (probably 5–6 meters; 16–20 feet), and metalled throughout (1943). Damaged by heavy traffic in the winter of 1941–42, it was still being improved and repaired in the early part of 1943.

One stone bridge, just south of Krdzhali, and a simple truss iron bridge just north of Momchilgrad, are vulnerable (each 120 meters; 394 feet long). The road is subject to snow blocking in winter.

TABLE VII - 44
BULGARIA, ROADS AND BRIDGES, 1939

Administrative Regions	Roads Km.	Roads Mi.	Road Density: Length of Roads per 1,000 Persons Km.	Road Density: Length of Roads per 1,000 Persons Mi.	Road Density: Length of Roads per Unit of Territory Km. per Sq. Km.	Road Density: Length of Roads per Unit of Territory Mi. per Sq. Mi.	Bridges: Bridges	Bridges: Culverts	Total
Burgaz	1,848	1,148	3.3	2.0	.14	.22	680	2,889	3,569
Vrattsa	2,435	1,513	3.5	2.1	.24	.38	724	2,849	3,573
Plovdiv	2,340	1,454	2.9	1.8	.15	.23	1,613	4,353	5,966
Pleven	4,018	2,496	4.0	2.5	.26	.41	1,549	7,468	9,017
Sofiya	2,889	1,796	2.5	1.6	.17	.27	1,981	6,732	8,713
Stara-Zagora	2,443	1,518	3.0	1.9	.15	.23	911	4,534	5,445
Shumen	3,581	2,225	3.5	2.1	.27	.43	841	5,458	6,299
Total	19,554	12,150	3.3	2.0	.19	.30	8,299	34,283	42,582

TABLE VII - 45
BULGARIA, ROADS UNDER CONSTRUCTION

Regions	Year	Roads: Waterbound Macadam New Construction Km.	Roads: Waterbound Macadam New Construction Mi.	Roads: Waterbound Macadam Under Repair Km.	Roads: Waterbound Macadam Under Repair Mi.	Roads: Stone Block Km.	Roads: Stone Block Mi.	Roads: Concrete Km.	Roads: Concrete Mi.	Roads: Bitumen Km.	Roads: Bitumen Mi.	Bridges and Culverts Number	Retaining Walls Meters	Retaining Walls Feet
Burgaz	1937	143	89	55	34	5	3	—	—	—	—	349	595	1,952
	1938	121	75	117	73	6	4	—	—	—	—	529	804	2,638
	1939	148	92	105	65	10	6	—	—	—	—	335	129	423
Vrattsa	1937	60	37	78	48	3	2	3	2	—	—	105	843	2,766
	1938	83	52	143	89	7	4	—	—	—	—	148	296	971
	1939	73	45	175	109	4	2	—	—	—	—	128	463	1,519
Plovdiv	1937	97	60	92	57	15	9	—	—	—	—	320	2,755	9,039
	1938	19	12	188	117	27	17	—	—	—	—	500	4,677	15,344
	1939	32	20	104	65	32	20	—	—	—	—	361	1,899	6,230
Pleven	1937	93	58	158	98	1	0.6	—	—	—	—	325	1,718	5,636
	1938	84	52	348	216	8	5	—	—	—	—	500	1,950	6,398
	1939	62	39	288	179	4	2	—	—	—	—	256	1,899	6,230

TABLE VII - 45 (*Continued*)

REGIONS	YEAR	ROADS: WATERBOUND MACADAM NEW CONSTRUCTION KM.	MI.	UNDER REPAIR KM.	MI.	STONE BLOCK KM.	MI.	CONCRETE KM.	MI.	BITUMEN KM.	MI.	BRIDGES AND CULVERTS NUMBER	RETAINING WALLS METERS	FEET
Sofiya	1937	51	32	184	114	42	26	—	—	—	—	844	2,632	8,635
	1938	42	26	218	135	48	30	—	—	—	—	833	4,760	15,617
	1939	73	45	230	143	48	30	—	—	—	—	639	3,613	11,854
Stara-Zagora	1937	128	80	79	49	1	0.6	—	—	—	—	363	615	2,018
	1938	163	101	128	80	1	0.6	—	—	—	—	670	1,278	4,193
	1939	70	43	109	68	3	2	—	—	—	—	346	431	1,414
Shumen	1937	101	63	249	155	2	1	—	—	—	—	235	91	299
	1938	101	63	231	144	4	2	—	—	—	—	440	100	328
	1939	80	50	250	155	6	4	—	—	1	0.6	325	103	338
Total	1937	673	419	895	555	69	42.2	3	2	—	—	2,541	9,249	30,345
	1938	613	381	1,373	854	101	62.6	—	—	—	—	3,620	13,865	45,489
	1939	538	334	1,261	784	107	66	—	—	1	0.6	2,390	8,999	28,004

78. *Inland Water Transport*

A. The Danube River.

The Danube is the only inland waterway in Bulgaria suitable for navigation. The Bulgarian sector of the Danube begins below the narrow passage of the Iron Gates at Kilometer 845* and extends for about 400 kilometers (about 250 miles) to Kilometer 447. Rumanian territory lies on the left bank for the whole distance.

(*1*) ***Channel.*** The ship channel is along the left or Rumanian bank almost all the way. The Bulgarian shore is generally high, often 500 to 600 feet (150–180 meters), and the Rumanian shore low and marshy.

(*a*) *Depth.* There is a minimum depth of 2.5 meters (8 feet).

(*b*) *Width.* The width varies from 2,280 feet (695 meters) at Calafat (Kilometer 793.5) to 7,200 feet (2,195 meters) at the mouth of the Tsibr River (Kilometer 716.5).

(*c*) *Other hydrographic features.* The widths of the river and the channel make any slight sinuosity unimportant. In general the Bulgarian Danube has easy bends. The fall is gentle, ranging from 0.033 per 1,000 at the Yugoslav border (Kilometer 844.5) to 0.069 per 1,000 at the narrowest part opposite Calafat (Kilometer 793–795). The current has a velocity of 0.4 to 0.6 meter per second, or about one mile per hour.

(*d*) *Seasonal variations.* Ice may appear on the Danube from late November until mid-March. The river is frozen and shipping is suspended for an average of 39 days. During the winter of 1941-42, the coldest in 140 years, shipping was not resumed until March, but 1942–43 was very mild and the channel was open by February 10. The first water rise comes in April with the melting of snow in the lowlands, and the second rise in June as water from the mountain snows enters the river. Sometimes these seasons overlap. The lowest water level comes in September and October.

(*2*) ***Obstructions.*** There are nearly a hundred islands in the Bulgarian Danube, ranging from some a few square yards in area, which are frequently inundated, to one 6½ miles (10.5 kilometers) long. Pilots are not required by law on the Bulgarian sector, but most shipping companies employ a regular staff of pilots. There are no fixed bridges on the Bulgarian Danube, although one is projected between Ruse and Giurgiu, with completion scheduled for 1948. In June 1943, pontoon bridges of German construction were reported at the Nikopol/Turnu/Magurele and Ruse/Giurgiu crossings. (Illustration VII - 33.) (Also see Illustration V - 11.)

(*3*) ***Ports.*** Bulgaria is the least important country on the Danube, and has the smallest and most poorly equipped ports. Ruse is the chief Bulgarian port, transshipping 183,000 metric tons (approximately 200,000 short tons) in 1937.

(*a*) *Wharfage and cranage.* Transfers are made chiefly by hand throughout the Balkans; Ruse, Lom and Vidin are the only Bulgarian ports with any mechanical equipment (Table VII - 47). The Bulgarian Government has appropriated large amounts in recent years, principally since the war began, for the improvement and extension of Ruse and Lom.

(*b*) *Storage facilities.* Storage space in Bulgarian harbors is not adequate to care for increased traffic resulting from the war.

(*c*) *Clearance.* Because of inadequate clearance facilities of the ports, official customs storehouses, public sheds and open storage space were all clogged with goods by the end of 1942.

(*4*) ***Hauling facilities.*** Most Bulgarian imports and exports on the Danube have been carried in foreign bottoms, chiefly under German or Rumanian registry. There are no shipyards on the Danube in Bulgaria. The Bulgarian river fleet, which is of varied origin, is shown in Table VII - 46.

TABLE VII - 46
BULGARIA, HAULING FACILITIES ON DANUBE—1937

TYPE OF VESSEL	NO.	HORSEPOWER TOTAL	HORSEPOWER AVERAGE	CAPACITY (MET. TONS) TOTAL	CAPACITY (MET. TONS) AVERAGE
(a) Steam and motor tugs	12	2,120	176	—	—
(b) Powered cargo vessels					
Passenger steamers	3	1,500	500	225	75
Motor boats	5	1,220	244	2,220	444
Tankers	14	1,600	114	5,600	400
(c) Non-powered vessels					
Barges	21	—	—	16,241	773
Tankers	0	—	—	—	—

(*5*) ***Capacity.*** The Danube has unlimited capacity along the Bulgarian sector, the only limits being established upstream along the Yugoslav/Rumanian part by the Iron Gates and the cataracts. Downstream the river can carry barges of 2,000 or 3,000 metric tons loading capacity. The limits for Bulgaria are established by the inadequate fleet, the poorly equipped ports, and the lack of clearance facilities to the interior.

*All measurements are from the Danube Mouth at Sulina, Rumania.

(6) *Traffic.* Bulgaria accounted for about a half million metric tons of Danube traffic before the war. This was almost equally divided according to flow, 55 per cent going upstream, of which the greatest part was Bulgarian agricultural products, and 45 per cent going downstream, consisting largely of machinery and manufactured goods from Germany, Czechoslovakia, and Hungary. The greatest traffic is recorded in autumn after harvest, the time when the water level is lowest. Of the 500,000 tons handled annually in Bulgarian ports, about 100,000 tons was local traffic with Rumania. Total figures give an unreal picture of Danube shipping in this sector, however, since most tonnage is transit traffic between Rumania and the middle or upper sections of the river. Bulgaria has been striving to increase her share of traffic, and volume has increased considerably since the war. This is partly due to railroad congestion, and agricultural products formerly carried by rail are now shipped upstream on the river. Downstream traffic, however, has decreased since the war.

Table VII - 47
BULGARIA, DANUBE RIVER PORTS

	Vidin	Lom	Somovit	Svishtov	Ruse
Port					
Km. above Sulina	791	744	608	535	496
Quays (Length in feet)					
Main quays	1,300	4,230 (stone)	1,440	1,270	2,600
Low quays	555	—	820	1,600	427
Other transfer facilities	Dredged frontage 820′	4 unloading floats 4 wharves, each 131 feet long	2 landing stages	—	Basin at mouth of Rusenski Lom/River, 16.35 acres; depth at quays, 6′.
Cranes	Hand	10-ton tractor crane or jetty 60-hp. motor (Diesel)	—	—	2 6.6-ton cranes; 1 sling-chain with 300-ton lifting cap.
Power	—	440 volts DC.	—	220/380 volts AC.	120/210 volts AC.
Storage					
Sheds (sq. ft.)	1 wood, 12,300	1 concrete, 15,000 3 wood, 44,500	—	3 wood, 11,300	11 wood, 66,000
Open (sq. ft.)	150,000	85,000	286,000	12,300	97,000
Oil (met. tons)	—	4 tanks, 220 each 2 tanks, 33 each	4 tanks, total 308	7 tanks, total 320	91 tanks, 35,480 (largest, 1,650)
Railways					
Length of port railway (feet)	4,500	9,150	—	4,900	27,700

B. Administration.

Ports and port construction are under the Office of Railroad and Port Construction, a subordinate of the Directorate of Railroads which, in turn, is one of the two divisions of the Ministry of Railroads, Posts, Telephone and Telegraph. Traffic is under the Ministry of Commerce, but German supervision of all Bulgarian Danube activity is exercised by the Advisory Committee for Danubian Affairs Above Braila. This committee was organized in the autumn of 1940, and meets from time to time in Danube cities. The sixth session was held in March 1943 and, like former meetings, "the deliberations resulted in complete unanimity on questions of interstate shipping."

79. *Merchant Shipping*

(*Note.* The following account of merchant shipping under the Bulgarian flag does not include vessels used exclusively on the Danube River, for which see Topic 77.)

A. Available tonnage.

(1) *Type.* The merchant fleet of Bulgaria, according to available information, consists of the following vessels listed in Table VII - 48.

(2) *Geographical distribution.* Bulgarian vessels are usually employed in coasting trade in the Black Sea and the Bosporus, though a few have been reported at Piraiéus, Greece.

(3) *Present use.* The *Pirin* is a trawler. The others are believed to be freighters, except the *Evdokia* which is reported to be a coastal passenger vessel. According to a report of January 1943, the *Rila* may be armed.

(4) *Owners.* The ownership of the vessels is as follows: S.S.'s *Balkan*, *Bourgas*, *Bulgaria*, and *Evdokia*, owned by Soc. Commerciale Bulgare de Nav. a Vap. at Varna.

The S.S. *Pirin* and the M.S. *Rila* are owned by J. Hansen at Varna. No information is available as to the ownership of the remaining vessels listed above.

Table VII - 48
BULGARIA, MERCHANT FLEET

Name	Built	Gross Tons	Fuel	Last Reported
Balkan (Illust. VII - 36.)	1914	3,838	Oil	28/5/42
Bourgas	1900	2,941	Coal	6/6/43
Bulgaria	1894	1,108	Coal	18/4/43
Evdokia	1928	706	Coal	—
Pirin	1904	199	Coal	—
Rila	—	194	Diesel	1/43
Tsar Ferdinand	1913	1,994	Coal	25/5/43
Le Progres*	1892	511	—	43
Small craft				
Raina*	—	—	—	23/8/42
Rodopi*	—	—	—	4/43
Biela Ptica*	—	—	—	16/4/43
Stariya Volk*	—	36	—	15/8/42

B. Immobilized tonnage.

(1) *Repair pool.* No data available.

*Nationality not confirmed.

(2) ***Building.*** The following shipbuilding plan was adopted by Bulgaria in 1940:

2 coastal cargo ships, 800 T.
2 passenger motor vessels, 700 T.
5 passenger-cargo vessels for Black Sea and Aegean trade.
3 cargo vessels, 1,000 T.
6 large passenger motor vessels for lower Danube and coastal trade.
5 tankers, 3,000 T.
6 ocean going cargo ships, 6,500 T.
5 ocean going cargo ships, 3,500 T.
an unspecified number of long distance coastal vessels.

No reports are available as to the extent this plan has been put into effect. However, it was reported on 31 January, 1941, that the shipyards of the Danube Shipping Co. at Budapest, Hungary, had at that time three modern passenger vessels under construction for Bulgaria.

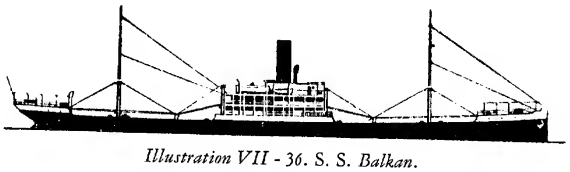


Illustration VII - 36. S. S. *Balkan.*

Gross Tons, 3,838. Length, 353.5 feet. Built, 1914
Approximate Service Speed, 12 knots.